CONSTRUCTION OF A COMPOSITE SOW INDEX AND STUDY OF ITS EFFECTS DUE TO SIRE, PARITY AND SEASON IN PIGS

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THESIS

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DECLARATION

I hereby declare that this thesis entitled "**Construction of a composite sow index and study of its effects due to sire, parity and season in pigs**" is a bonafide record of research work done by me during the course of research work and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or Society.

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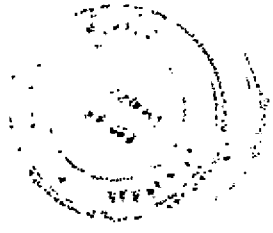

CERTIFICATE

Certified that this thesis entitled "**Construction of a composite sow index and study of its effects due to sire, parity and season in pigs**" is a record of research work done independently by **Miss Cini Varghese** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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To my loving parents

CONTENTS

Introduction

1. INTRODUCTION

Pig breeding has become a lucrative profession on proper management. The demand for pig meat is increasing day by day. A large number of people are interested in rearing pigs for edible purposes and thereby making a reasonable profit. As the maintenance of pigs at a household level is possible for medium type of families with their kitchen waste and other cheap edible materials, it has become more economical and viable. The growth rate in new breeds such as Yorkshire is much higher than that of the local breed. It is very essential to have a critical study of the various economic characters of pigs. So far very few studies have been made about the growth rate and culling of uneconomic animals. It is very essential to have a systematic study under Kerala condition for the age at farrowing, post weaning conception period, litter size at birth, average weight of a piglet at birth, litter size at weaning and average weight of a piglet at weaning; and finally to select the economic animals with the help of a proper selection index based on the above characters.

The notable work in this line has been done by few scientists and research workers such as Hazel(1943), Hanson & Johnson(1956), Elston(1963), Binet(1965), Schaaf & Hammer(1980), Milkami(1982), Tomes & Newman(1982), Sandu *et al.*(1983), Taraboanta *et al.* (1983), Zhang(1983), Ollivier (1984), Narain(1985), Sorensen (1988) and Hartwig *et al.*(1990). Little work has been done in India.

At present the Kerala Agricultural University is maintaining a modern type of Pig breeding farm with all facilities and has gained national reputation. Data of the above

mentioned six characters were being recorded and are available from 1978 onwards at the Kerala Agricultural University Pig Breeding Farm. The data from 1978 to 1992 has been made available for the present study of "Construction of a composite sow index and study of its effects due to sire, parity and season in pigs" based on the following objectives.

1. Construction of a composite sow index for pigs.
2. To study the effect of sire, parity and season on this index.
3. To suggest for culling the uneconomic animals based on this index.

In this study, three aspects of the pig breeding are being proposed to be undertaken. In first part, three different types of indices viz.,

1. phenotypic index based on one main character and one auxiliary character
2. phenotypic index based on one main character and two auxiliary characters and
3. a composite sow index are to be worked out.

The second part consisting of the investigation of the effect of climate, in farrowing as well as growth of piglings. The third aspect of this study is to identify the best sow, sire, sow-sire combination, parity and to suggest for culling the uneconomic animals.

It is believed that the results obtained from this investigation will be much useful to the farmers to attain maximum production and thereby optimise the return in pig breeding.

Review of Literature

2. REVIEW OF LITERATURE

In animal breeding, selection is defined as choosing of superior parents for next generation. Individual selection is the simplest form, in which individuals with better phenotypic value for a trait are selected to increase the mean value of that trait in future generation. In practice, many traits influence an animal's practical value in varying degrees. Hence, simultaneous selection for several characters is also equally important. It is effectively accomplished by constructing selection indices.

Selection indices are very useful in animal breeding selection problem, to discourage over emphasis upon traits with low heritabilities or with small economic values. It has been helpful in ranking animals with markedly different amount of information, notably in artificial insemination sire evaluation.

The first pioneer work in the field of selection index in Animal Science is due to Hazel (1943). A lot of literature on selection index in both plants and animals are now available. An attempt is made to review the works of various research workers in field of animal science, especially in pigs.

Hazel (1943) used the method of multiple trait selection and emphasized the importance of weighting by economic values. He showed that genetic gain made by selection for several traits simultaneously within a group of animals was the product of selection differential, the multiple correlation between aggregate breeding value and selection index and genetic

variability. An index $I = b_1X_1 + b_2X_2 + ...+ b_nX_n$ where X's represent the phenotypic performance for several traits and b_i's are the multiple regression coefficients was used. On the basis of this index, two indices were constructed for pigs.

$$I_1 = 0.137\ W - 0.268\ S \text{ and}$$

$$I_2 = 0.136\ W - 0.232\ S + 0.164\ P \text{ where W is}$$

the pig's own 180-day weight, S is the market score and P is the productivity of the dam.

Bernard *et al.* (1954) constructed two selection indices for improvement of pigs under farm conditions. The index which best estimated the transmitting ability of 5 month old pig was $I_d' = - 0.5\ X_1 + 7\ X_2 - 0.02\ X_3 + 0.5\ X_4$

where X_1 is the number farrowed, X_2, X_3, and X_4 represent the litter size, litter weight and the individual pig weight at 154 days, respectively. A more simpler index recommended for estimating the transmitting ability of a pig for its economically important traits was

$$I_a' = 4.5\ X_2 + 0.5\ X_4$$

Hanson and Johnson (1956) formulated methods for calculating and evaluating a general selection index. A criterion for the determination of an average selection index from two or more segregating populations had been presented. The criterion is that the phenotypic weights be so selected that the average genetic advance is a maximum. The ratio of the expected genetic advance for a general index to the maximum genetic advance expected for the data utilising a selection index, was the expected correlation between the indexes of phenotypic values obtained with the two indexes. Of the factors involved in the construction of a selection index, economic worth was the consistent element.

Elston (1963) brought out a weight free index for the purpose of ranking or selecting individuals with respect to measures on several traits jointly when nothing is to be assumed about what economic weights are appropriate. A selection or ranking index was developed on intuitive grounds and then shown to be in a certain sense weight-free. The indexes developed were as given below:

(1) If the histograms obtained for the various traits were similarly shaped, the index used was

$$\prod_{i=1}^{p} (x_i - k_i)$$

(2) If the histograms were not similarly shaped, the smallest sample value of x_i' that occurs (ignoring the value $x_i' = -\infty$) was subtracted from each value of $x_i' = \log(x_i - k_i)$, i.e., $(x_i' - k_i')$ was obtained and the index used was

$$\prod_{i=1}^{p} (x_i' - k_i')$$

where x_i 's are measurements on a particular trait, k_i 's are smallest sample measurement occurs for that trait and $x_i' = \log(x_i - k_i)$.

Binet (1965) constructed an index for indirect selection by applying certain modifications to the classical method of Smith (1936). From the resulting biometrical formulae an expression was deduced by elementary algebraic methods, which yields (subject to certain regularity conditions) the optimal linear combination of two measurable characters for selection, aiming at genetic improvement in a third. The index used was

$$I = \frac{x^*}{\hat{\sigma}_{x^*}} + \frac{b\, y^*}{\hat{\sigma}_{y^*}}$$

where x^* and y^* are x and y expressed in natural units respectively where x and y are the observed quantitative heritable characters. The coefficient b is solved by the standard methods of mathematical statistics, $\hat{\sigma}_{x^*}$ and $\hat{\sigma}_{y^*}$ are standard deviations of x^* and y^*.

Schaaf and Hammer (1980) brought out the significance of simulated selection for testing the efficiency of selection indices in pigs. In a simulation experiment, the effectiveness of a non - linear index incorporating average daily gain, backfat thickness, sidefat thickness and loin-eye area was studied. There were 28 variants of the index, differing in weight factors for the traits.

Milkami (1982) evaluated the effectiveness of index selection in seven swine strains. The index incorporated average daily gain, backfat thickness, loin-eye area and ham percentage. In most strains, the realised h^2s (heritability) of traits, estimated from the regressions of responses on cumulative selection differentials in the index, agreed well with the expected h^2s. The realised and expected selection responses, in standard deviation units, were 0.09 and 0.12 respectively for daily gain, -0.19 and -0.19 respectively for backfat, 0.32 and 0.23 respectively for loin-eye area, and 0.04 and 0.07 for ham percentage.

Tomes and Newman (1982) studied initial responses to selection for littersize in pigs. Parental stock originated from litters averaging 16.47 piglets (14.80 after correction to first parity). First generation sows produced 9.08 $\pm$ 0.32 and 9.82 $\pm$ 0.56 live piglets in first and second litters respectively. Second generation sows produced 9.61 $\pm$ 0.49 and 10.35 $\pm$ 0.34 live piglets in corresponding litters v/s. 8.48 $\pm$ 0.26 and 9.21 $\pm$ 0.34 for unselected controls.

Sandu *et al.* (1983) evaluated biological efficiency of traits and selection indices in sire lines of pigs. Feed conversion efficiency was genetically correlated with average daily gain, backfat thickness, loin-eye area and percentage of lean in the carcass. Biological efficiency was measured as live weight gain per kg. feed consumed, live weight per cm backfat thickness, and weight of lean meat per kg feed consumed. Three selection indices were constructed.

Taraboanta *et al.* (1983) conducted a study on some selection indices for breeding sows. They compared 3 selection indices for predicting piglet population per sow at weaning. The best index was

$$I = 7 \text{ (littersize at birth)} + \text{piglet weight at 21 days.}$$

Zhang (1983) studied about phenotypic and genetic parameters of reproductive traits in Tai Hu pigs and several recommended selection indices. The six traits considered were littersize at birth, number of liveborn piglets per litter, littersize at weaning, litter weight at birth, litter weight at weaning and average daily gain of piglets from birth to weaning. The h^2 estimates for the 6 traits were 0.09, 0.14, 0.15, 0.12, 0.18 and 0.42 respectively. Non-restricted, restricted and optimum indices for the selection of male and female replacements were determined.

Diaz Rodriguez (1984) estimated genetic parameters for traits included in the pig selection index. The h^2s of weight for age, average daily gain and backfat thickness were 0.23,0.21 and 0.44 respectively.

Ollivier (1984) updated selection indices used at testing stations in France since 1981. The indices were

(1) an index incorporating 3 performance traits

(2) a progeny testing index incorporating 9 traits measured on each of 8 daughters

(3) sib index incorporating 9 traits measured on each of 2 sisters, and

(4) a combined index incorporating indices (1) and (3).

Calculations showed that selection based on any of the 4 indices would produce increases in daily gain and weight of the longissimus dorsi muscle (index (2) producing the greatest increases), and decreases in feed conversion ratio and meat quality index. Modifications to indices (2) and (3) designed to maintain meat quality reduced their efficiency by only 5%. A similar modification to index (1) reduced its efficiency by 54%.

Narain (1985) explained the problem of determining the breeding worth of a male on the basis of the phenotypic values of his female progeny. The use of one or more auxiliary traits in connection with the main trait for progeny testing seemed to have an edge over the conventional method in which no auxiliary traits were used. A general expression for the accuracy of selection based on the progeny test was derived and a generalised sire index was proposed.

Avalos and Smith (1987) conducted a study on genetic improvement of litter size in pigs. The low heritability (0.1) for litter size in pigs, quite high rates of genetic improvement were predicted theoretically using conventional selection methods. The highest rates were predicted from schemes with rapid generation turn over (1 year) and with selection of both

males and females at breeding age on a family selection index. This index combined litter records (two on each relative) of the dam, her full sibs and half sibs, and of the sire's dam and his full sibs and half sibs. A series of selection indices were derived, (I_1 to I_6) successively adding additional blocks of relatives to the base index I_1.

$I_1 = b_{11} D$

$I_2 = b_{21} D + b_{22} DFS$

$I_3 = b_{31} D + b_{32} DFS + b_{33} DHS$

$I_4 = b_{41} D + b_{42} DFS + b_{43} DHS + b_{44} SFS$

$I_5 = b_{51} D + b_{52} DFS + b_{53} DHS + b_{54} SFS + b_{55} SHS$

$I_6 = b_{61} D + b_{62} DFS + b_{63} DHS + b_{64} SFS + b_{65} SHS + b_{66} SD$

where D denotes dam, DFS and DHS denote her full sibs and half sibs respectively, SFS and SHS denote sire's full sibs and half sibs, and SD denotes sire's dam. Despite the high rate of genetic change possible for litter size, omission of the trait from an index which includes growth and carcass traits resulted in only small losses in economic improvement of general purpose stocks. The losses will be higher in specialized dam stocks and inclusion of litter size in an index when selecting such stocks will be worthwhile.

Klussacek *et al.* (1988) constructed a selection index of the reproductive efficiency of sows of the dam breeds. The index I_{RU} was defined as a function of litter size at birth (x_1), the number (x_2)and weight (x_3)of all piglets in the litter reared until 21 days of age, and the length of farrowing interval (x_4) where I_{RU} was given by

$$I_{RU} = \frac{20\,x_1 + 80\,x_2 + 18.2\,x_3}{0.2\,x_1 + 0.8\,x_2 + 0.182\,x_3} \left(\frac{0.42\,x_2}{x_4} + 0.58 \right)$$

special emphasis was laid on x_2 and x_3 values. This selection index serves to determine the potential mothers of breeding boars and gilts in the elite stocks. It can also be used as a reference criterion of the reproductive efficiency of the sows of different stocks, cross combinations, lines and breeds.

Sorensen (1988) evaluated the effect of selection index versus mixed model methods of prediction of breeding value on response to selection in a simulated pig population. Selection response for a single trait was compared in two sets of simulated pig populations. In one set, breeding values were computed using a selection index which included the performance of the candidate, its full- and half-sibs and its progeny, if available. In the other set of simulations, breeding values were computed using a reduced animal model (RAM) with a complete relationship matrix. The three factors that contributed to the smaller response using index selection were

(1) the sources of bias introduced in the construction of the selection index owing to genetic trend,

(2) the bias of the ordinary least-square estimator of fixed effects owing to genetic trend,

(3) the smaller accuracy of the selection index relative to RAM.

Hartwig *et al.* (1990) studied about the construction and evaluation of an index of meat quality for boar progeny based on transformed trait values. In a selection simulation study, data on driploss (DL), meat colour (MC) and pH of meat from the progeny were used to construct a selection index. Prior to index construction, trait values were subjected to logarithmic transformation:

y(transformed trait value) = $-\log_e$ abs(x - X_{opt}) + c, where x is the original trait value, X_{opt} is the optimum trait value, and c is breed/trait constant. The use of an optimum trait value in the transformation reduced the variance of the traits. The indices for the four breeds were as follows:

Landrace: I = DL + 0.6171 MC + 0.9134 pH

Edelschwein: I = DL + 0.4834 MC + 1.0542 pH

Leicoma: I = DL + 0.3405 MC + 1.6724 pH

Schwerfurt Meat: I = DL + 0.8279 MC + 0.8005 pH

A selection index was proposed by Morikov (1990) comprising age at 100kg, daily gain, feed conversion, carcass length, backfat thickness at 100kg, eye-muscle area, and weight of the rear third of the half-carcass of pigs. The h^2 of the index was 0.163 (sire-component), and 0.557 (dam-component), the sire-son correlation for the index was 0.374 $\pm$ 0.10, and the dam-daughter correlation was 0.574 $\pm$ 0.11. It was estimated that, using the index, the selection aim would be achieved in 8.6 generations v/s. 175 generations when using the traditional selection methods.

Ferraz and Duarate (1991) applied selection indices to productivity in Large White Sows. Combining the traits number of stillborn, litter size (TL) and weight (PL) at birth (O), at 21 days of age (21) and weaning (d), six selection indices were proposed. The expected genetic gains were estimated and their values did not recommend the utilization of these indices.

Materials and Methods

3. MATERIALS AND METHODS

This study was aimed at the construction of a composite sow index and study of its effects due to sire, parity and season in pigs. The data from the production records of about 255 pigs (sow cards) maintained at the Kerala Agricultural University Pig Breeding Farm, Mannuthy during 1978-'92 was utilised for this study. The characters under investigation were

1. Age at farrowing (months)
2. Post weaning conception period (months)
3. Litter size at birth
4. Average weight of a piglet at birth (Kg.)
5. Litter size at weaning
6. Average weight of a piglet at weaning(Kg.)

Data pertaining to these six characters were collected for all the available parities. Among the six characters, the litter size and average weight of a piglet at the time of birth and weaning were considered as economic characters (main characters). Age at farrowing and post weaning conception period were always contributing to the above mentioned economic characters. Thus these two characters were considered as auxiliary characters. The characters were classified as follows:-

Main Characters	**Auxiliary Characters**
Litter size at birth(Y_1)	Age at farrowing (X_1)
Average weight of a pigletat birth(Y_2)	Post weaning conception period(X_2)
Litter size at weaning(Y_3)	
Average weight of a piglet at weaning(Y_4)	

Different types of selection indices were worked out and their efficiencies were compared using the data collected for the above mentioned characters.

3.1. Phenotypic Index

The indices attempted were:

(a) *INDEX BASED ON ONE MAIN CHARACTER AND ONE AUXILIARY CHARACTER*

Phenotypic index of the form $I = y - bx$ for one main character and one auxiliary character was independently constructed for all the pairs of main characters (y) and auxiliary characters(x), where b is the regression coefficient of y on x which was worked out as

$$b = r_{xy}\left[\frac{s_y}{s_x}\right]$$

Where r_{xy} = phenotypic correlation between y and x

s_y = phenotypic standard deviation of y

s_x = phenotypic standard deviation of x

In the same manner eight phenotypic indices viz.,

$I_1 : y_1$ v/s x_1

$I_2 : y_1$ v/s x_2

$I_3 : y_2$ v/s x_1

$I_4 : y_2$ v/s x_2

$I_5 : y_3$ v/s x_1

$I_6 : y_3$ v/s x_2

$I_7 : y_4$ v/s x_1

$I_8 : y_4$ v/s x_2

were constructed, for individual sows under each parity.

Number of pigs under each parity

Parity	No: of pigs
1	255
2	126
3	71
4	25
5	8

The indices were also worked out on the basis of mean values of main and auxiliary characters under each parity. The b being the common regression coefficient between two particular characters y and x, for all the cases under a particular parity, it was taken as a constant in this particular situation. The efficiencies of these indices were compared by estimating the variances as follows:-

Let $I'_1, I'_2, I'_3, I'_4, I'_5, I'_6, I'_7, I'_8$ be the indices based on the mean values.

Let $I'_i = \bar{y}_i - b_i\bar{x}_i$, $i = 1,2,.....,8.$

$$V(I'_i) = V(\bar{y}_i)+b^2_iV(\bar{x}_i)-2b_iCov(\bar{y}_i,\bar{x}_i)$$

$$= (1/n)V(y_i) +(b^2_i/n)V(x_i)-2(b_i/n)Cov(y_i,x_i)$$

where n is the number of sows considered under each parity. The efficiency of any index over another index can be worked out, using the ratio of their informations.

$$E_{(ij)} = \frac{1/V(I'_i)}{1/V(I'_j)} = \frac{V(I'_j)}{V(I'_i)}$$

where $E_{(i,j)}$ denotes the efficiency of i^{th} index over j^{th} index . If $E_{(i,j)} > 1$, then i^{th} index is more efficient than j^{th} index. If $E_{(i,j)} < 1$, then i^{th} index is less efficient over j^{th} index.

(b.) *INDEX BASED ON ONE MAIN CHARACTER AND TWO AUXILIARY CHARACTERS*

In general, if $x_1, x_2, x_3, \ldots\ldots, x_p$ are p auxiliary variables,, and y is the main character then the index can be given as

$$I = y - b_{y1.23\ldots p}x_1 - b_{y2.13\ldots p}x_2 - \ldots - b_{yj.12\ldots j-1\ j+1\ldots p}x_j - \ldots - b_{yp.12\ldots p-1}x_p.$$

where $b_{yj.12\ldots j-1\ j+1\ldots p} = -\left[\begin{array}{cc} S_y & R_{yj} \\ \hline S_j & R_{yy} \end{array}\right]$

is the partial regression coefficient of y on x_j, for fixed $x_1, x_2 \ldots\ldots x_{j-1}, x_{j+1}\ldots\ldots x_p$. R_{yj} being the cofactor of r_{yj} in the correlation determinant R where

$$R = \begin{vmatrix} r_{yy} & r_{y1}\ldots\ldots\ldots r_{yp} \\ r_{1y} & r_{11}\ldots\ldots\ldots r_{1p} \\ r_{2y} & r_{21}\ldots\ldots\ldots r_{2p} \\ \ldots\ldots\ldots\ldots\ldots\ldots \\ \ldots\ldots\ldots\ldots\ldots\ldots \\ r_{py} & r_{p1}\ldots\ldots\ldots r_{pp} \end{vmatrix}$$

and s_j is the phenotypic standard deviation of x_j.

$$I = y - \sum_{j=1}^{p} b_{yj.123\ldots j-1\ j+1\ldots p}x_j$$

$$V(I) = V(y) + \sum_{j=1}^{p} b^2_{yj.12\ldots j-1\ j+1\ldots p}V(x_j) - 2\sum_{j=1}^{p} b_{yj.12\ldots j-1\ j+1\ldots p}Cov(y,x_j)$$

If indices are constructed on the basis of mean values of each variable,

$$I' = \bar{Y} - \sum_{j=1}^{p} b_{yj.123\ldots j-1\ j+1\ldots p}\bar{X}_j$$

with variance,

$$V(I') = (1/n)V(y) + (1/n)\sum_{j=1}^{p} b^2_{yj.12\ldots j-1\,j+1\ldots p}V(x_j) - 2/n)\sum_{j=1}^{p} b_{yj.12\ldots j-1\,j+1\ldots p}Cov(y,x_j)$$

where n is the number of individuals under each variable.

We get the index based on one main character and two auxiliary characters as

$$I = y - b_{y1.2}x_1 - b_{y2.1}x_2$$

where $b_{y1.2}$ is the partial regression coefficient of y on x_1 keeping x_2 fixed; therefore

$$b_{y1.2} = \frac{S_y(r_{y1} - r_{y2}r_{12})}{S_1\ (1-r_{12}^2)}$$

and $b_{y2.1}$ is the partial regression coefficient of y on x_2 keeping x_1 fixed ; therefore

$$b_{y2.1} = \frac{S_y(r_{y2}-r_{y1}r_{12})}{S_2(1-r_{12}^2)}$$

where r_{yj} = phenotypic correlation between y and x_j, j = 1,2.

S_y = phenotypic standard deviation of y and

S_j = phenotypic standard deviation of x_j, j = 1,2.

Four phenotypic indices viz.,

$I_{1,12}$: y_1 v/s x_1 and x_2

$I_{2,12}$: y_2 v/s x_1 and x_2

$I_{3,12}$: y_3 v/s x_1 and x_2

$I_{4,12}$: y_4 v/s x_1 and x_2

were constructed, for individual sows under each parity. These indices were also worked out on the basis of mean values of main and auxiliary characters under each parity. For a particular parity, the regression coefficients $b_{y1.2}$ and $b_{y2.1}$ can be considered as constants since they express the common regression coefficients between two particular characters y and x_j, j=1,2. The efficiencies of these indices were compared by esti mating the variances as follows:-

Let $I = y - b_{y1.2}x_1 - b_{y2.1}x_2$

$V(I) = V(y) + b^2_{y1.2} V(x_1) + b^2_{y2.1} V(x_2) - 2b_{y1.2} Cov(y,x_1) - 2b_{y2.1}Cov(y,x_2)$

Indices worked out on the basis of mean values, are of the form

$$I' = \bar{y} - b_{y1.2} \bar{x}_1 - b_{y2.1} \bar{x}_2$$

$V(I') = (1/n) V(y) + (1/n) b^2_{y1.2}V(x_1) + (1/n)b^2_{y2.1} V(x_2)$

$- (2/n)b_{y1.2}Cov(y,x_1) -(2/n)b_{y2.1}Cov(y,x_2)$

where n is the number of sows considered under each parity.

Let $I'_{1,12}$, $I'_{2,12}$, $I'_{3,12}$ and $I'_{4,12}$ be the indices based on the mean values. The efficiency of any index over another index was worked out, using the ratio of informations as already mentioned in 3.1(a).

3.2. Composite Sow Index

A composite sow index was constructed for every sow at first farrowing by considering the following normal conditions:age at first farrowing (12 months), litter size at birth(8 numbers), litter weight at birth(10 Kg), litter size at weaning (8numbers), litter weight at weaning (72 Kg) and post weaning conception period (within one fortnight). The indices for other farrowings were also constructed by giving suitable adjustment to farrowing age.

The normal age at first farrowing was taken as 12 months. A score I_{a1} for age at first farrowing was obtained by adding or subtracting 0.2 points for every additional month so that the score

$$I_{a1} = 1 + (12 - x_1)0.2$$

where x_1 = age at farrowing.

The normal litter size at birth was 8. A score I_b for litter size at birth was o adding or subtracting 0.2 points for every additional piglet. Hence,

$$I_b = 1 + (x_2 - 8)0.2$$

where x_2 = litter size at birth.

The normal litter weight at birth was 10 kg. Hence the average weight of a piglet at the time of birth was 1.25 kg. A score I_c for average weight of a piglet at birth was obtained by adding or subtracting 0.2 points for every increase of one Kg. so that the score

$$I_c = 1 + (x_3 - 1.25)0.2$$

where x_3 = average weight of a piglet at birth.

A normal litter size at weaning was 8. By adding or subtracting 0.2 points for every piglets increased or decreased, a score I_d for litter size at weaning was obtained. Hence

$$I_d = 1 + (x_4 - 8)0.2$$

where x_4 = litter size at weaning.

The normal litter weight at weaning was 72 kg. Hence the average weight of a piglet at

the time of weaning was 9 kg. A score I_e for average weight of a piglet at weaning was worked out by adding or subtracting 0.2 points for every one Kg. increase or decrease of weight. Hence

$$I_e = 1 + (x_5 - 9)0.2$$

where x_5 = average weight of a piglet at weaning.

Normally, the post weaning conception was within 15 days. Subtracting 0.2 for every additional fortnight we obtained a score I_f for post weaning conception period and hence

$$I_f = 1 + (0.5 - x_6)0.2$$

where x_6 = post weaning conception period on fortnight basis.

The composite sow index for every sow was constructed by adding the indices of the above six items in each sow's case. Hence

$$I_1 = I_{a_1} + I_b + I_c + I_d + I_e + I_f$$

This index I_1 was of the form

$$I = c + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 + a_6x_6$$

where c and a_i's are constants. For a standard pig, the value of this index will be six.

The above index was constructed for the data of each sow under each of the five farrowings.The age at farrowing changes from parity to parity. The total conception period is approximately 6 months from one parity to next parity. Out of these 180 days, normally 50 days are accounted for weaning, 15 days for post weaning conception period and 115 days for gestation period. Hence the normal age at second farrowing is taken as 18 months. Similarly, the age at third farrowing is 24 months, age at fourth farrowing is normally 30 months and age at fifth

farrowing is normally 36 months.

For second parity $I_2 = I_{a2} + I_b + I_c + I_d + I_e + I_f$

where $I_{a2} = 1 + (18 - x_1)0.2$.

For third parity $I_3 = I_{a3} + I_b + I_c + I_d + I_e + I_f$

where $I_{a3} = 1 + (24 - x_1)0.2$.

For fourth parity $I_4 = I_{a4} + I_b + I_c + I_d + I_e + I_f$

where $I_{a4} = 1 + (30 - x_1)0.2$.

For fifth parity $I_5 = I_{a5} + I_b + I_c + I_d + I_e + I_f$

where $I_{a5} = 1 + (36 - x1)0.2$.

For the comparison of efficiency of this index with the other indices already obtained, the variance was estimated as given below. The composite index on the basis of the mean values of these six characters under consideration was constructed as

$$I' = c + a_1\bar{x}_1 + a_2\bar{x}_2 + a_3\bar{x}_3 + a_4\bar{x}_4 + a_5\bar{x}_5 + a_6\bar{x}_6 = c + \sum a_i\bar{x}_i$$

Hence the variance of I' was obtained as

$$V(I') = \sum_i a_i^2 \, V(\bar{x}_i) + 2 \sum_i \sum_j a_i a_j \, Cov(\bar{x}_i, \bar{x}_j)$$

$$= (1/n) \sum_i a_i^2 V(x_i) + (2/n) \sum_i \sum_j a_i a_j \, Cov(x_i, x_j)$$

The efficiency of this index over other indices was obtained by comparing their informations as worked out in the previous cases.

The influence of sire on the various characters was studied through, first identifying the sows mated to the same sire under different parities. The most efficient index selected based on the various characters of the sows and its litters was used for identifying the best sire. For this purpose the individual indices of the most efficient index was worked out for each sow under different parities. The sire producing the maximum score on a group of sows was taken as the best sire for further breeding.

Using the most efficient index worked out from among the different types of indices mentioned above, the indices of each sow for different parities were obtained. The sows having at least 3 to 4 parities were considered for this purpose. The indices for different parities were compared and thereby the best parity was determined.

The most efficient index worked out for the entire sow population under each parity were classified on the basis of the various seasons. The entire year was divided into three seasons, say, (1) winter season including the months October, November, December and January (2) summer season including the months February, March, April and May and (3) rainy season consisting of the months June, July, August and September. The season having generally maximum index score was considered as the most congenial season for breeding.

By combining the results of all the above studies, one can point out a most efficient sow index, the best parity, most efficient sire and the appropriate season for further breeding.

Results

4. RESULTS

The data of 255 pigs from the sow cards of pigs maintained at the University Pig Breeding Farm, Mannuthy for all the available five parities were collected for the study. The characters considered were:

1. Age at farrowing (months)
2. Post weaning conception period (months)
3. Litter size at birth
4. Average weight of a piglet at birth (kg)
5. Litter size at weaning
6. Average weight of a piglet at weaning (kg)

The mean values of main characters and auxiliary characters under different parities were given in table 4.1.

Three following types of indices were calculated using these data.

1. Phenotypic Index

For this, age at farrowing (X_1) and post weaning conception period (X_2) were considered as auxiliary characters and litter size at birth (Y_1), average weight of a piglet at birth (Y_2), litter size at weaning (Y_3) and average weight of a piglet at weaning (Y_4) were considered as main characters.

Two types of phenotypic indices were calculated as explained below.

(a) ***Index based on one main character and one auxiliary character***

Index values were calculated for each animal in each parity by using the formula I = Y - bX. Eight indices were calculated by taking all pairs of main characters and auxiliary characters as given in 3.1. The indices were given in appendix 1(a), 1(b), 1(c), 1(d), and 1(e). For each parity and for each combination, variances were also calculated by taking the mean values. Since these indices do not contain all the characters simultaneously, the average value of the variance of the eight indices were found and was used for comparison with other indices. The b values and the variance and covariance of auxiliary characters and main characters were given in tables 4.2 and 4.3. The phenotypic indices, their variances and their average variance were given in tables 4.4 and 4.5. The efficiency of the different phenotypic indices of pigs based on one main character and one auxiliary character were also worked out under different parities and were given in table 4.6.

(b)***Index based on one main character and two auxiliary characters***

Four indices were obtained by taking one main character and two auxiliary characters at a time. Four indices by taking four different combinations of each main character and two auxiliary characters simultaneously were calculated for each animal and for each parity by using the formula $$I = Y - \sum_{i=1}^{p} b_{yj.123..j-1j+1..p} X_j.$$

The indices were given in appendix 2(a), 2(b), 2(c), 2(d) and 2(e). Variances were calculated for each indices under each parity based on the mean values. Also, the average value of

variances of each indices under each parity were found for comparison purpose. The values of the partial regression coefficients, indices based on the mean values, the variance of the phenotypic indices, and the average variances were given in tables 4.7, 4.8, and 4.9. The efficiencies of these indices were worked out and given in table 4.10.

2. Composite Sow Index

Composite sow index, of the form $I = c + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6$ was worked out, by considering all the above mentioned six characters as independent contributary characters. These index values were calculated for each pig using the above mentioned six characters by giving suitable weights to each as explained in materials and methods, and were given in appendix 3(a), 3(b), 3(c), 3(d) and 3(e). The variance of the index for each parity was also calculated by taking the mean values as given in table 4.11.

To find out the best sow-sire combinations, a table of ranks was also prepared for all the three indices jointly. For this, best 25 sow-sire combinations were sorted out by considering the composite sow index and the corresponding ranks for these combinations under other indices (if it is within 25) were also noted for comparison. The same procedure has been done for all the five parities. They were shown in tables 4.12, 4.13, 4.14, 4.15 and 4.16.

Classification of the best 25 animals into these three seasons viz. winter season, summer season and rainy season was done based on their date of farrowing. Same procedure was done for each parity. Average of index values under each season and each parity were also worked out and shown in tables 4.17, 4.18, 4.19, 4.20 and 4.21.

To find out the sow effect, the best performing 25 sows were sorted out based on their composite sow index values. Again sorting was done for the better performing sows repeated under different parities. They were given in table 4.22 and were used for studying the sow effect. For each of these sorted out animals, average index value under different parities and also the average values for all the six contributing characters were calculated, and were given in table 4.23.

Sire effect was also studied in the same way. Best 25 sires were selected based on their composite sow index values under each parity. The animals showing good performance in most of the parities were selected from these 25 animals. They were given in table 4.24. For each of the selected sires, average of the index value under different parities and the average values for all the contributing characters were found, as given in table 4.25.

The joint effect of sow and sire was studied in the following way. The best performing 25 sow-sire combinations were sorted out based on their composite sow index values. Again selection was done among these by sorting out those sow-sire combinations which gave good results for more than one parity. They were given in table 4.26. Average value of the index under all parities for each of these selected sow-sire combination was found and also the average values of the six contributing characters were found as shown in table 4.27.

To identify the best parity, the sows which were having at least three parities were sorted out as shown in table 4.28.

Table 4.1
Mean values of main and auxiliary characters under different parities of pigs

Parity	Number of pigs under each parity	$\bar{Y}_1$	$\bar{Y}_2$	$\bar{Y}_3$	$\bar{Y}_4$	$\bar{X}_1$	$\bar{X}_2$
1	255	6.67451	1.321569	5.890197	9.575296	17.84353	2.671726
2	126	7.373017	1.320636	6.579366	9.463492	24.81746	2.526111
3	71	7.633803	1.342254	6.619718	9.267605	31.33239	2.422535
4	25	7.72	1.356	6.32	9.048001	39.392	2.404
5	8	8.5	1.3625	7.5	8.4875	46.5375	1.2625

X_1 = Age at farrowing X_2 = Post weaning conception period

Y_1 = Litter size at birth Y_2 = Average weight of a piglet at birth

Y_3 = Litter size at weaning Y_4 = Average weight of a piglet at weaning

Table 4.2
Table of b values for the phenotypic index with one main character and one auxiliary character

Parity	$b(Y_1,X_1)$	$b(Y_1,X_2)$	$b(Y_2,X_1)$	$b(Y_2,X_2)$	$b(Y_3,X_1)$	$b(Y_3,X_2)$	$b(Y_4,X_1)$	$b(Y_4,X_2)$
1	0.01034416	-0.02106097	-0.003659588	0.0005311698	0.03402253	-0.004328847	0.02109564	0.03188725
2	0.01712657	0.06660297	0.007929553	0.004213359	0.01634733	0.06457577	0.001762435	-0.0214902
3	0.08197118	0.1451966	0.01296843	-0.0002416687	0.07372035	0.0707051	-0.05831388	-0.1691212
4	0.04876946	0.2626769	0.005933578	0.006631419	0.09425832	0.1886937	-0.03232112	-0.3036717
5	0.08476629	0.03055827	-0.004011959	0.02826595	0.03110795	-0.0583367	-0.04179526	-0.007431122

X_1 = Age at farrowing X_2 = Post weaning conception period

Y_1 = Litter size at birth Y_2 = Average weight of a piglet at birth

Y_3 = Litter size at weaning Y_4 = Average weight of a piglet at weaning

Table 4.4

Phenotypic index ($I' = \bar{y} - b\bar{x}$) of pigs based on the mean values of one main character and one auxiliary character under different parities

Parity	I_1': (Y_1,X_1)	I_2': $(Y_1'X_2)$	I_3': (Y_2,X_1)	I_4': (Y_2,X_2)	I_5': (Y_3,X_1)	I_6': (Y_3,X_2)	I_7': (Y_4,X_1)	I_8': (Y_4,X_2)
1	6.4900	6.7308	1.3869	1.3202	5.2832	5.9018	9.1989	9.4902
2	6.9480	7.2048	1.1239	1.3100	6.1737	6.4163	9.4198	9.5178
3	5.0655	7.2821	0.9360	1.3429	4.3099	6.4485	11.0948	9.6774
4	5.7989	7.0886	1.1223	1.3401	2.6070	5.8664	10.3212	9.7781
5	4.5552	8.4615	1.5493	1.3269	6.0524	7.5737	10.4326	8.4969

X_1 = Age at farrowing X_2 = Post weaning conception period

Y_1 = Litter size at birth Y_2 = Average weight of a piglet at birth

Y_3 = Litter size at weaning Y_4 = Average weight of a piglet at weaning

Table 4.5

Variance of the different phenotypic indices of pigs based on the mean value of one main character and one auxiliary character under different parities

Parity	$V(I_1')$	$V(I_2')$	$V(I_3')$	$V(I_4')$	$V(I_5')$	$V(I_6')$	$V(I_7')$	$V(I_8')$	Average of variances
1	0.01762034	0.01761062	0.00014022	0.00014158	0.01635311	0.01647164	0.02149932	0.02149765	0.0139167
2	0.04167823	0.04124119	0.00015516	0.00016728	0.03808015	0.03766741	0.03334728	0.03329562	0.0282039
3	0.07515575	0.07539858	0.00034587	0.00042118	0.06773372	0.06951154	0.05596121	0.05373115	0.0497823
4	0.2202025	0.1783418	0.00043066	0.00047288	0.1475628	0.1416221	0.3332008	0.27289	0.1615985
5	0.3538794	0.392557	0.00096181	0.00079233	0.3161792	0.3203348	0.3028224	0.3122807	0.2499759

Table 4.6

Efficiency of the different phenotypic indices of pigs based on one main character and one auxiliary character in different parities

Parity		I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8
1	I_1		0.9994484	0.007957612	0.008035273	0.9280814	0.9348084	1.220143	1.220047
	I_2			0.007962005	0.008039706	0.9285936	0.9353244	1.220816	1.220721
	I_3				1.009759	116.6281	117.4735	153.3302	153.3183
	I_4					115.5009	116.3381	151.8483	151.8365
	I_5						1.007248	1.314693	1.314591
	I_6							1.305233	1.305131
	I_7								0.9999219
	I_8								
2	I_1		0.9895139	0.003722709	0.00401363	0.9136701	0.9037669	0.8001126	0.7988733
	I_2			0.003762159	0.004056163	0.9233525	0.9133443	0.8085916	0.807339
	I_3				1.078148	245.4316	242.7714	214.9275	214.5946
	I_4					227.6419	225.1745	199.3489	199.0401
	I_5						0.9891611	0.8757128	0.8743562
	I_6							0.8853086	0.8839372
	I_7								0.998451
	I_8								
3	I_1		1.003231	0.004602049	0.005604069	0.9012448	0.9248999	0.7446033	0.7149306
	I_2			0.004587227	0.00558602	0.8983421	0.9219211	0.7422051	0.7126281
	I_3				1.217734	195.8356	200.9757	161.7982	155.3505
	I_4					160.8197	165.0408	132.8683	127.5735
	I_5						1.026247	0.8261943	0.7932703
	I_6							0.8050636	0.7729816
	I_7								0.9601498
	I_8								
4	I_1		0.809899	0.001955733	0.002147492	0.6701235	0.6431451	1.513157	1.239269
	I_2			0.002414787	0.002651555	0.8274161	0.7941053	1.868328	1.530152
	I_3				1.098049	342.6456	328.8511	773.703	633.6593
	I_4					312.0494	299.4866	704.6158	577.0772
	I_5						0.9597412	2.258027	1.849314
	I_6							2.352746	1.926888
	I_7								0.8189956
	I_8								
5	I_1		1.109296	0.002717912	0.002238997	0.8934659	0.905209	0.8557221	0.8824494
	I_2			0.002450123	0.002018394	0.8054351	0.8160211	0.77141	0.795504
	I_3				0.823793	328.7325	333.0531	314.8454	324.6792
	I_4					399.0474	404.2922	382.19	394.1271
	I_5						1.013143	0.9577557	0.9876699
	I_6							0.9453309	0.9748571
	I_7								1.031234
	I_8								

Table 4.7

Table of b values (partial regression coefficients) for the phenotypic index with one main character and two auxiliary characters

Parity	$b_{Y_1 X_1 . X_2}$	$b_{Y_1 X_2 . X_1}$	$b_{Y_2 X_1 . X_2}$	$b_{Y_2 X_2 . X_1}$	$b_{Y_3 X_1 . X_2}$	$b_{Y_3 X_2 . X_1}$	$b_{Y_4 X_1 . X_2}$	$b_{Y_4 X_2 . X_1}$
1	0.009954088	-0.02064641	-0.003652426	0.0003790557	0.03396748	-0.002914189	0.02171516	0.03279164
2	0.01768256	0.06689371	0.007965646	0.004344328	0.01688636	0.06485343	0.00158403	-0.02146416
3	0.08865103	0.1579888	0.01303776	0.001639655	0.07718071	0.08184213	-0.06586625	-0.1786257
4	0.0134316	0.2571015	0.005325955	0.004420552	0.0724569	0.1586164	0.009987518	-0.3078175
5	0.1323844	0.3418208	-0.0001104948	0.02800616	0.03417483	0.02201522	-0.06369218	-0.1571843

X_1 = Age at farrowing X_2 = Post weaning conception period

Y_1 = Litter size at birth Y_2 = Average weight of a piglet at birth

Y_3 = Litter size at weaning Y_4 = Average weight of a piglet at weaning

Table 4.8

Phenotypic index ($I' = \bar{Y} - b_1\bar{X}_1 - b_2\bar{X}_2$) of pigs based on the mean values of one main character and two auxiliary characters in different parities

Parity	I_1': Y_1 V/s X_1 & X_2	I_2': Y_2 V/s X_1 & X_2	I_3': Y_3 V/s X_1 & X_2	I_4': Y_4 V/s X_1 & X_2
1	6.5521	1.3858	5.2919	9.1003
2	6.7652	1.1120	5.9965	9.4785
3	4.4735	0.9298	4.0032	11.7641
4	6.5729	1.1356	3.0845	9.3946
5	1.9077	1.3323	5.8818	11.6501

X_1 = Age at farrowing X_2 = Post weaning conception period

Y_1 = Litter size at birth Y_2 = Average weight of a piglet at birth

Y_3 = Litter size at weaning Y_4 = Average weight of a piglet at weaning

Table 4.9
Variance of the different phenotypic indices of pigs based on the mean values of one main character and two auxiliary characters in different parities

Parity	$V(I_1')$	$V(I_2')$	$V(I_3')$	$V(I_4')$	Average of Variances
1	0.01759961	0.0001402	0.01635233	0.02145182	0.0138859
2	0.0411755	0.00015315	0.03760756	0.03329494	0.0280577
3	0.07243097	0.00034633	0.0670994	0.05224568	0.0480305
4	0.1760524	0.00040494	0.1250362	0.274426	0.1439798
5	0.3970188	0.00078761	0.3172116	0.3126135	0.2569078

Table 4.10
Efficiency of the different phenotypic indices based on one main character and two auxiliary characters in different parities

Parity		I_1	I_2	I_3	I_4
1	I_1 I_2 I_3 I_4		0.007966299	0.9291302 116.6326	1.21881 153.0046 1.311851
2	I_1 I_2 I_3 I_4		0.003719343	0.913348 245.567	0.8086105 217.4068 0.8853258
3	I_1 I_2 I_3 I_4		0.004781509	0.9263911 193.7445	0.7213168 150.8555 0.778631
4	I_1 I_2 I_3 I_4		0.002300127	0.7102217 308.7751	1.558775 677.691 2.194772
5	I_1 I_2 I_3 I_4		0.001983819	0.7989837 402.7503	0.7874023 396.9124 0.9855048

Table 4.11
Variance of the composite sow index

Parity	Variance
1	0.007111393
2	0.01541926
3	0.02340515
4	0.1402232
5	0.1124024

Table 4.12

Table showing the first ranking 25 composite sow indices, along with the ranks under the other two indices (if it is within first 25) under parity I

Composite sow index				Ranks of phenotypic index based on one main character and one auxiliary character								Ranks of phenotypic index based on one main character and two auxiliary characters			
Rank	Sow	Sire	Index	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_1	I_2	I_3	I_4
1	05/047	02/051	7.170	3	6			2	4			4		2	
2	07/218	01/091	6.550	21				11	19			25		11	
3	07/160	01/182	6.150							16	16				15
4	09/204	01/181	6.110	24				13	18					13	
5	03/020	08/265	5.990					23						24	
6	09/153	01/138	5.850	1	1			3	2			1		3	
7	08/409	01/318	5.810							17	18				16
8	06/080	02/103	5.790				24								
9	06/308	02/321	5.750	7	20							13			
10	10/160	04/157	5.750	23		2	2	12	15				2	12	
11	09/321	02/275	5.730					22						22	
12	08/180	01/181	5.710												
13	06/205	01/091	5.710	8	15	4	3	5	9			12	4	5	
14	03/183	01/056	5.610							22	20				
15	10/230	05/191	5.550												
16	09/019	008620	5.450			14	12						13		
17	10/047	01/059	5.430				17								
18	06/081	02/103	5.270		16				17			15			
19	07/295	01/138	5.250		5			4	3			6		4	
20	05/023	04/371	5.250	10	13			6	8			10		6	
21	03/335	02/143	5.210												
22	02/004	01/265	5.190	25											
23	02/276	02/209	5.178												
24	09/160	04/157	5.170			11	8			21	23				21
25	10/189	04/178	5.150												

Table 4.13
Table showing the first ranking 25 composite sow indices along with the ranks under the other two indices (if it is within first 25) under parity II

Composite sow index				Ranks of phenotypic index based on one main character and one auxiliary character								Ranks of phenotypic index based on one main character and two auxiliary characters			
Rank	Sow	Sire	Index	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_1	I_2	I_3	I_4
1	05/242	01/191	7.850												
2	07/160	01/182	6.490	24						11	11	23			11
3	05/183	01/091	6.350	9	13					23	25	8			24
4	02/345	04/321	6.330							12	13				12
5	08/180	01/091	6.030	10	9			11	13			9		11	
6	08/334	02/275	6.010							18	19				19
7	02/004	08/002	5.950	2	2							2			
8	10/160	04/157	5.730					12	22			25		13	
9	06/298	02/036	5.490		24			16	12			24		12	
10	03/004	08/265	5.410												
11	04/040	03/392	5.290	16	17	3	10	5	6			14	3	5	
12	08/098	03/246	5.290							10	9				9
13	04/141	04/371	5.270			15							11		
14	06/137	02/036	5.250		5			2	1			6		2	
15	07/209	03/392	5.250	1	1			6	7			1		6	
16	08/280	01/138	5.250			24							23		
17	06/331	03/179	5.190			21							19		
18	07/009	04/051	5.190	19	11			7				13		4	
19	02/248	01/053	5.170					23	16					18	
20	09/150	04/371	5.130		7			1	2			4		1	
21	08/198	02/036	5.130	14	10			17	15			10		15	
22	10/367	03/011	5.110	13	16			14	23			11		16	
23	07/082	04/172	5.110												
24	08/166	03/246	5.010							1	1				1
25	10/233	04/371	4.990												

Table 4.14

Table showing the first ranking 25 composite sow indices along with the ranks under the other two indices (if it is within first 25) under parity III

Composite sow index				Ranks of phenotypic index based on one main character and one auxiliary character								Ranks of phenotypic index based on one main character and two auxiliary characters			
Rank	Sow	Sire	Index	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_1	I_2	I_3	I_4
1	08/098	03/246	6.270							9	9				10
2	07/254	02/314	6.130		23			15	16			18		10	
3	08/198	02/036	5.870	8	7			2	2			7		2	
4	05/308	01/318	5.830			2	18				10		2		16
5	07/082	01/037	5.790					16	21	7	8	23		14	8
6	11/265	08/002	5.690	7	9	5	20			17	18	5	5		21
7	05/143	01/184	5.550			24							24		
8	09/126	03/159	5.550	17	16					5	6	15			7
9	07/160	01/182	5.530												
10	09/371	01/140	5.530												
11	04/323	01/317	5.370									22			
12	07/261	01/262	5.270							24	23				
13	07/175	04/371	4.950	3	2			9	7			3		7	
14	09/153	02/137	4.870			22				2	2		22		2
15	06/084	01/037	4.790									25		16	
16	06/298	03/392	4.690	18	17	17						17	17		
17	06/143	03/031	4.670	12	10			3	3			8		3	
18	08/303	01/317	4.670	15	20			7				16		5	
19	05/324	01/319	4.550	25				14	25			24		13	
20	09/150	04/371	4.430	11	12			20	23			9		20	
21	06/200	06/018	4.430							22	25			24	
22	07/218	02/209	4.430	2	3			1	1			1		1	
23	07/271	01/140	4.330												25
24	03/331	03/392	4.250	13	11	10	9	4				10	10	4	
25	09/218	01/191	4.250												23

Table 4.15
Table showing the first ranking 25 composite sow indices along with the ranks under the other two indices (if it is within first 25) under pariity IV

Composite sow index				Ranks of phenotypic index based on one main character and one auxiliary character								Ranks of phenotypic index based on one main character and two auxiliary characters			
Rank	Sow	Sire	Index	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_1	I_2	I_3	I_4
1	05/308	02/314	6.650	6	6	21	23	2	6	12	13	4	21	2	12
2	04/324	01/381	5.750	9	11	17	17	13	13	4	4	10	14	10	4
3	07/160	01/037	5.010	17	16	13	15	21	22	9	8	16	13	21	8
4	04/141	01/138	4.710	18	17	6	7	12	10	10	12	17	7	9	11
5	06/200	06/018	4.590	10	9	18	13	3	5	19	23	8	16	3	23
6	05/162	06/018	4.570	13	8	23	22	5	4	11	15	9	23	4	15
7	05/324	01/262	4.570	3	2	22	24	18	18	18	21	2	22	19	21
8	06/143	01/038	4.190	7	5	25	25	10	7	13	17	5	25	7	17
9	02/345	01/262	4.150	22	22	12	19	16	19	21	22	21	12	17	22
10	05/143	03/392	3.910	23	21	15	18	23	24	7	6	22	15	23	6
11	08/072	04/017	3.910	2	1	10	8	1	1	24	25	1	10	1	25
12	06/298	03/392	3.870	4	3	8	11	19	20	22	24	3	8	20	24
13	10/328	03/088	3.710	14	10	20	16	15	11	14	19	11	18	12	19
14	03/353	04/051	3.570	15	12	9	9	11	8	6	7	12	9	8	7
15	05/184	03/312	3.310	25	25	3	2	25	25	1	1	25	1	25	1
16	06/023	02/036	3.270	19	20	1	5	14	16	5	5	20	2	14	5
17	04/295	02/036	3.110	21	18	5	3	20	12	2	2	18	4	18	2
18	04/040	02/143	2.890	20	19	11	10	22	23	3	3	19	11	22	3
19	03/268	02/137	2.510	16	14	4	4	17	14	15	18	13	3	16	18
20	09/255	01/410	0.390	5	15	19	21	9	17	20	14	15	20	15	13
21	04/196	01/054	0.330	24	24	7	1	24	21	8	11	24	6	24	14
22	04/287	01/184	0.170	11	7	24	20	8	2	16	20	7	24	5	20
23	06/333	03/392	0.050	8	13	16	12	7	3	17	16	14	17	6	16
24	05/341	01/280	-0.83	12	23	2	6	4	15	23	9	23	5	11	9
25	08/256	01/184	-3.39	1	4	14	14	6	9	25	10	6	19	13	10

Table 4.16
Table showing all the 8 composite sow indices along with the ranks under the other two indices Under parity V

Composite sow index				Ranks of phenotypic index based on one main character and one auxiliary character								Ranks of phenotypic index based on one main character and two auxiliary characters			
Rank	Sow	Sire	Index	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_1	I_2	I_3	I_4
1	05/324	01/144	4.690	6	7	7	5	4	6	6	6	4	5	4	7
2	06/023	03/392	4.310	3	2	8	8	5	5	3	3	2	8	5	3
3	07/160	02/038	4.130	7	8	1	1	7	7	2	1	8	1	7	2
4	08/072	01/037	4.050	1	1	4	4	1	1	8	8	1	4	1	8
5	03/268	02/143	3.810	5	5	3	2	3	3	1	2	5	3	3	1
6	06/298	02/143	3.370	2	3	5	6	2	2	7	7	3	6	2	6
7	04/295	02/036	2.110	8	6	2	3	8	8	5	5	7	2	8	5
8	08/256	02/036	1.590	4	4	6	7	6	4	4	4	6	7	6	4

Table 4.17

Classification of the sow-sire combinations on the basis of composite sow index under different seasons in parity I

Winter season					Summer season					Rainy season				
Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing
1	05/047	02/051	7.1700	25.12.1975	3	07/160	01/182	6.1500	25.03.1988	4	09/204	01/181	6.1100	19.06.1982
2	07/218	01/091	6.5500	28.01.1982	6	09/153	01/138	5.8500	20.03.1991	5	03/020	08/265	5.9900	27.07.1979
12	08/180	01/181	5.7100	02.11.1981	8	06/080	02/103	5.7900	13.03.1980	7	08/409	01/318	5.8100	17.08.1984
14	03/183	01/056	5.6100	07.11.1988	9	06/308	02/321	5.7500	26.05.1983	15	10/230	05/191	5.5500	28.06.1982
17	10/047	01/059	5.4300	21.12.1975	10	10/160	04/157	5.7500	10.05.1981	16	09/019	008620	5.4500	02.09.1979
18	06/081	02/103	5.2700	25.10.1980	11	09/321	02/275	5.7300	08.04.1983					
23	02/276	02/209	5.1780	13.01.1983	13	06/205	01/091	5.7100	17.04.1982					
25	10/189	04/178	5.1500	23.01.1982	19	07/295	01/138	5.2500	18.02.1992					
					20	05/023	04/371	5.2500	22.03.1990					
					21	03/335	02/143	5.2100	07.02.1992					
					22	02/004	01/265	5.1900	14.05.1979					
					24	09/160	04/157	5.1700	12.04.1981					
Average			5.7585		Average			5.5667		Average			5.7820	

Table 4.18

Classification of the sow-sire combinations on the basis of composite sow index under different seasons in parity II

Winter seascn					Summer season					Rainy season				
Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing
2	07/160	01/182	6.4900	10.10.1988	1	05/242	01/191	7.8500	05.05.1983	6	08/334	02/275	6.0100	16.08.1983
4	02/345	04/321	6.3300	07.01.1984	3	05/183	01/091	6.3500	01.04.1982	18	07/009	04/051	5.1900	28.06.1988
7	02/004	08/002	5.9500	08.11.1979	5	08/180	01/091	6.0300	29.04.1982	20	09/150	04/371	5.1300	11.09.1991
8	10/160	04/157	5.7300	25.12.1981	11	04/040	03/392	5.2900	22.02.1991	22	10/367	03/011	5.1100	26.09.1992
9	06/298	02/036	5.4900	16.01.1990	12	08/098	03/246	5.2900	18.04.1988	23	07/082	04/172	5.1100	11.06.1988
10	03/004	08/265	5.4100	21.10.1979	13	04/141	04/371	5.2700	06.03.1991					
14	06/137	02/036	5.2500	22.12.1991	15	07/209	03/392	5.2500	20.02.1992					
19	02/248	01/053	5.1700	23.11.1989	16	08/280	01/138	5.2500	02.04.1992					
21	08/198	02/036	5.1300	30.12.1991	17	06/331	03/179	5.1900	09.05.1990					
24	08/166	03/246	5.0100	20.12.1988	25	10/233	04/371	4.9900	02.02.1992					
Average			5.5960		Average			5.6760		Average			5.3100	

Table 4.19
Classification of the sow-sire combinations on the basis of composite sow index under different seasons in parity III

Winter season					Summer season					Rainy season				
Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing
1	08/098	03/246	6.2700	20.10.1985	4	05/308	01/318	5.8300	08.02.1984	3	08/198	02/036	5.8700	27.06.1992
2	07/254	02/314	6.1300	17.11.1983	8	09/126	03/159	5.5500	05.04.1978	7	05/143	01/184	5.5500	10.09.1991
5	07/082	01/037	5.7900	20.12.1988	9	07/160	01/182	5.5300	10.03.1989	11	04/323	01/317	5.3700	12.07.1984
6	11/265	08/002	5.6900	13.11.1979	10	09/371	01/140	5.5300	13.04.1993	13	07/175	04/371	4.9500	26.08.1992
12	07/261	01/262	5.2700	30.11.1983	14	09/153	02/137	4.8700	28.04.1992	16	06/298	03/392	4.6900	07.07.1990
23	07/271	01/140	4.3300	10.11.1992	15	06/084	01/037	4.7900	10.03.1989	17	06/143	03/031	4.6700	04.06.1992
					18	08/303	01/317	4.6700	29.05.1984	21	06/200	06/018	4.4300	26.06.1992
					19	05/324	01/319	4.5500	23.04.1984	25	09/218	01/191	4.2500	19.06.1983
					20	09/150	04/371	4.4300	28.04.1992					
					22	07/218	02/209	4.4300	25.03.1983					
					24	03/331	03/392	4.2500	22.04.1990					
Average			5.5800		Average			4.9482		Average			4.9725	

Table 4.20
Classification of the sow-sire combinations on the basis of composite sow index under different seasons in parity IV

Winter season					Summer season					Rainy season				
Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing
3	07/160	01/037	5.0100	10.10.1989	2	04/324	01/381	5.7500	28.02.1985	1	05/308	02/314	6.6500	07.08.1984
5	06/200	06/018	4.5900	22.12.1992	7	05/324	01/262	4.5700	06.02.1985	4	04/141	01/138	4.7100	10.07.1992
6	05/162	06/018	4.5700	15.12.1992	11	08/072	04/017	3.9100	22.03.1990	10	05/143	03/392	3.9100	05.07.1992
8	06/143	01/038	4.1900	15.12.1992	24	05/341	01/280	-0.8300	10.05.1991	13	10/328	03/088	3.7100	23.08.1985
9	02/345	01/262	4.1500	02.01.1985						18	04/040	02/143	2.8900	20.09.1992
12	06/298	03/392	3.8700	26.01.1991						19	03/268	02/137	2.5100	10.06.1991
14	03/353	04/051	3.5700	04.01.1992						21	04/196	01/054	0.3300	07.09.1991
15	05/184	03/312	3.3100	12.12.1990						23	06/333	03/392	0.0500	29.06.1992
16	06/023	02/036	3.2700	13.01.1992										
17	04/295	02/036	3.1100	16.12.1991										
20	09/255	01/410	0.3900	02.01.1985										
22	04/287	01/184	0.1700	14.10.1992										
25	08/256	01/184	-3.3900	15.01.1992										
Average			2.8315		Average			3.3500		Average			3.0950	

Table 4.21

Classification of the sow-sire combinations on the basis of composite sow index under different seasons in parity V

Winter season					Summer season					Rainy season				
Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing	Rank	Sow	Sire	Index	Date of farrowing
2	06/023	03/392	4.3100	27.10.1992	3	07/160	02/038	4.1300	06.04.1990	1	05/324	01/144	4.6900	31.08.1985
5	03/268	02/143	3.8100	13.01.1992						4	08/072	01/037	4.0500	18.09.1990
										6	06/298	02/143	3.3700	20.08.1991
										7	04/295	02/036	2.1100	19.06.1992
										8	08/256	02/036	1.5900	20.08.1992
Average			4.0600		Average			4.1300		Average			3.2240	

Table 4.22
Best sows selected based on their composite sow index value

Parity I			Parity II			Parity III			Parity IV			Parity V		
Rank	Sow	Index	Rank	Sow	Index	Rank	Sow	Index	Rank	Sow	Index	Rank	Sow	Index
2	07/218	6.550	2	07/160	6.490	1	08/098	6.270	1	05/308	6.650	1	05/324	4.690
3	07/160	6.150	4	02/345	6.330	3	08/198	5.870	3	07/160	5.010	3	07/160	4.130
6	09/153	5.850	5	08/180	6.030	4	05/308	5.830	4	04/141	4.710	4	08/072	4.050
10	10/160	5.750	7	02/004	5.950	5	07/082	5.790	5	06/200	4.590	6	06/298	3.370
12	08/180	5.710	8	10/160	5.730	9	07/160	5.530	7	05/324	4.570	7	04/295	2.110
22	02/004	5.190	9	06/298	5.490	14	09/153	4.870	9	02/345	4.150	8	08/256	1.590
			11	04/040	5.290	16	06/298	4.690	11	08/072	3.910			
			12	08/098	5.290	19	05/324	4.550	12	06/298	3.870			
			13	04/141	5.270	20	09/150	4.430	17	04/295	3.110			
			20	09/150	5.130	21	06/200	4.430	18	04/040	2.890			
			21	08/198	5.130	22	07/218	4.430	21	04/196	0.330			
			23	07/082	5.110				25	08/256	-3.39			

Table 4.23
Average of the composite sow index and the six charracters of the selected sows

Sow No.	Parity	Rank	Index	Age at Farrowing	Litter size at birth	Average weight of a piglet at birth	Litter size at weaning	Average weight of a piglet at weaning	Post weaning conception period
07/218	I	2	6.550	10.2	9	1.1	9	8.7	0.8
	III	22	4.430	24.1	12	1.1	12	7.8	7.7
	Mean		5.490		10.5	1.1	10.5	8.25	4.25
07/160	I	3	6.150	12.9	7	1.3	7	13.4	0.9
	II	2	6.490	19.4	9	1.0	8	12.1	0.5
	III	9	5.530	25.6	7	1.0	7	9.9	0.2
	IV	3	5.010	31.4	7	1.3	4	10.0	0.3
	V	3	4.130	37.3	6	1.5	6	10.5	3.4
	Mean		5.462		7.2	1.22	6.4	11.18	1.06
09/153	I	6	5.850	17.3	12	1.4	11	8.0	1.3
	III	14	4.870	30.6	8	1.4	5	13.8	1.0
	Mean		5.360		10	1.4	8	10.9	1.15
10/160	I	10	5.750	12.7	9	2.0	9	8.5	1.9
	II	8	5.730	20.2	9	1.3	9	9.0	1.1
	Mean		5.740		9	1.65	9	8.75	1.5
08/180	I	12	5.710	13.0	7	1.3	7	10.1	0.3
	II	5	6.030	18.9	10	1.1	9	6.6	0.2
	Mean		5.870		8.5	1.2	8	8.35	0.25
02/004	I	22	5.190	13.1	9	1.1	2	10.8	0.3
	II	7	5.950	18.9	11	1.2	7	6.9	0.1
	Mean		5.570		10	1.15	4.5	8.85	0.2
02/345	II	4	6.330	17.9	7	1.2	7	12.0	0.2
	IV	9	4.150	29.8	5	1.3	5	6.7	1.1
	Mean		5.240		6	1.25	6	9.35	0.65
06/298	II	9	5.490	22.8	9	1.3	9	8.6	0.2
	III	16	4.690	28.5	9	1.4	7	8.2	1.2
	IV	12	3.870	35.2	10	1.4	5	6.2	1.4
	V	6	3.370	42.0	10	1.4	8	7.1	4.2
	Mean		4.355		9.5	1.375	7.25	7.525	1.75
04/040	II	11	5.290	24.2	10	1.5	10	9.0	1.3
	IV	18	2.890	43.2	6	1.4	4	13.7	1.1
	Mean		4.090		8	1.45	7	11.35	1.2
08/098	II	12	5.290	18.1	5	1.3	4	12.5	0.5
	III	1	6.270	24.2	7	1.0	7	12.4	0.3
	Mean		5.780		6	1.15	5.5	12.45	0.4

Table 4.23 continues

Sow No.	Parity	Rank	Index	Age at Farrowing	Litter size at birth	Average weight of a piglet at birth	Litter size at weaning	Average weight of a piglet at weaning	Post weaning conception period
04/141	II	13	5.270	17.5	6	1.4	5	10.3	0.8
	IV	4	4.710	33.7	6	1.4	6	9.5	0.2
	Mean		4.990		6	1.4	5.5	9.9	0.5
09/150	II	20	5.130	23.5	11	1.4	11	7.0	2.0
	III	20	4.430	31.1	10	1.3	8	8.6	1.7
	Mean		4.780		10.5	1.35	9.5	7.8	1.85
08/198	II	21	5.130	23.7	10	1.4	9	6.8	0.3
	III	3	5.870	29.6	10	1.3	10	9.3	0.2
	Mean		5.500		10	1.35	9.5	8.05	0.25
07/082	II	23	5.110	20.9	7	1.0	7	10.1	0.7
	III	5	5.790	27.2	8	1.0	8	12.4	1.0
	Mean		5.450		7.5	1.0	7.5	11.25	0.85
05/308	III	4	5.830	22.5	5	1.5	5	12.0	0.3
	IV	1	6.650	28.5	9	1.2	8	9.4	0.3
	Mean		6.240		7	1.35	6.5	10.7	0.3
05/324	III	19	4.550	23.6	8	1.2	8	8.0	3.8
	IV	7	4.570	33.1	10	1.2	5	7.0	1.0
	V	1	4.690	39.9	7	1.3	7	7.7	0.2
	Mean		4.603		8.33	1.23	6.67	7.57	1.67
06/200	III	21	4.430	29.5	6	1.3	6	10.2	0.3
	IV	5	4.590	35.3	8	1.3	8	6.6	0.2
	Mean		4.510		7	1.3	7	8.4	0.25
08/072	IV	11	3.910	42.6	11	1.4	10	5.8	0.4
	V	4	4.050	48.5	11	1.4	11	6.2	0.8
	Mean		3.980		11	1.4	10.5	6	0.6
04/295	IV	17	3.110	46.2	6	1.5	6	14.3	0.4
	V	7	2.110	52.3	7	1.4	6	7.9	0.1
	Mean		2.610		6.5	1.45	6	11.1	0.25
08/256	IV	25	-3.39	49.7	13	1.4	9	5.2	15.3
	V	8	1.59	57.0	9	1.3	7	8.3	0.7
	Mean		-0.90		11	1.35	8	6.75	8

Table 4.24
Best sires selected based on their composite sow index value

Parity I			Parity II			Parity III			Parity IV			Parity V		
Rank	Sire	Index	Rank	Sire	Index	Rank	Sire	Index	Rank	Sire	Index	Rank	Sire	Index
2	01/091	6.550	2	01/182	6.490	1	03/246	6.270	1	02/314	6.650	2	03/392	4.310
(13)		(5.710)	3	01/091	6.350	2	02/314	6.130	3	01/037	5.010	4	01/037	4.050
3	01/182	6.150	(5)		(6.030)	3	02/036	5.870	4	01/138	4.710	5	02/143	3.810
4	01/181	6.110	6	02/275	6.010	4	01/318	5.830	5	06/018	4.590	(6)		(3.370)
(12)		(5.710)	7	08/002	5.950	5	01/037	5.790	(6)		(4.570)	7	02/036	2.110
5	08/265	5.990	8	04/157	5.730	(15)		(4.790)	7	01/262	4.570	(8)		(1.590)
6	01/138	5.850	9	02/036	5.490	6	08/002	5.690	(9)		(4.150)			
(19)		(5.250)	(14,		(5.250,	7	01/184	5.550	10	03/392	3.910			
7	01/318	5.810	21)		5.130)	9	01/182	5.530	(12,		(3.870,			
10	04/157	5.750	10	08/265	5.410	10	01/140	5.530	23)		0.050)			
(24)		(5.170)	11	03/392	5.290	(23)		(4.330)	14	04/051	3.570			
11	02/275	5.730	(15)		(5.250)	12	01/262	5.270	16	02/036	3.270			
20	04/371	5.250	12	03/246	5.290	13	04/371	4.950	(17)		(3.110)			
21	02/143	5.210	13	04/371	5.270	(20)		(4.430)	18	02/143	2.890			
23	02/209	5.178	(20,		(5.130,	14	02/137	4.870	19	02/137	2.510			
			25)		4.990)	16	03/392	4.690	22	01/184	0.170			
			16	01/138	5.250	(24)		(4.250)						
			18	04/051	5.190	21	06/018	4.430						
						22	02/209	4.430						

The values given in the paranthesis relates the values of the corresponding items when the sire is being repeated under the same parity

Table 4.25
Average of the composite sow index and the six characters of the selected sires

Sire No.	Parity	Rank	Index	Age at Farrowing	Litter size at birth	Average weight of a piglet at birth	Litter size at weaning	Average weight of a piglet at weaning	Post weaning conception period
01/091	I	2	6.550	10.2	9	1.1	9	8.7	0.8
		13	5.710	14.6	10	1.9	10	7.1	1.3
	II	3	6.350	17.0	10	1.2	5	11.0	0.6
		5	6.030	18.9	10	1.1	9	6.6	0.2
	Mean		6.160		9.75	1.325	8.25	8.35	0.725
01/182	I	3	6.150	12.9	7	1.3	7	13.4	0.9
	II	2	6.490	19.4	9	1.0	8	12.1	0.5
	III	3	5.530	25.6	7	1.0	7	9.9	0.2
	Mean		6.057		7.67	1.1	7.33	11.8	0.53
01/181	I	4	6.110	12.9	9	1.3	9	9.0	0.8
		12	5.710	13.0	7	1.3	7	10.1	0.3
	Mean		5.910		8	1.3	8	9.55	0.55
08/265	I	5	5.990	12.8	8	1.4	8	9.4	0.4
	II	10	5.410	18.3	8	1.2	7	6.8	0.2
	Mean		5.700		8	1.3	7.5	8.1	0.3
01/138	I	6	5.850	17.3	12	1.4	11	8.0	1.3
		19	5.250	19.4	11	1.3	11	6.2	0.3
	II	16	5.250	21.9	9	1.4	8	10.0	1.5
	IV	4	4.710	33.7	6	1.4	6	9.5	0.2
	Mean		5.265		9.5	1.375	9	8.425	0.825
01/318	I	7	5.810	7.6	3	1.3	3	13.2	0.3
	III	4	5.830	22.5	5	1.5	5	12.0	0.3
	Mean		5.820		4	1.4	4	12.6	0.3
04/157	I	10	5.750	12.7	9	2.0	9	8.5	1.9
		24	5.170	11.7	6	1.8	4	13.0	2.0
	II	8	5.730	20.2	9	1.3	9	9.0	1.1
	Mean		5.550		8	1.7	7.33	10.17	1.67
02/275	I	11	5.730	11.3	8	1.2	8	7.6	0.8
	II	6	6.010	14.0	5	1.3	5	11.4	0.7
	Mean		5.870		6.5	1.25	6.5	9.5	0.75
04/371	I	20	5.250	14.9	10	1.4	10	8.0	2.5
	II	13	5.270	17.5	6	1.4	5	10.3	0.8
		20	5.130	23.5	11	1.4	11	7.0	2.0
		25	4.990	22.9	9	1.4	8	9.9	1.6
	III	13	4.950	33.3	11	1.4	9	8.7	0.4
		20	4.430	31.1	10	1.3	8	8.6	1.7
	Mean		5.003		9.5	1.38	8.5	8.75	1.5

Table 4.25 continues

Sire No.	Parity	Rank	Index	Age at Farrowing	Litter size at birth	Average weight of a piglet at birth	Litter size at weaning	Average weight of a piglet at weaning	Post weaning conception period
02/143	I	21	5.210	15.6	8	1.4	8	8.7	0.6
	IV	18	2.890	43.2	6	1.4	4	13.7	1.1
	V	5	3.810	49.2	8	1.4	8	10.3	0.1
		6	3.370	42.0	10	1.4	8	7.1	4.1
	Mean		3.820		8	1.4	7	9.95	1.475
02/209	I	23	5.178	12.9	7	1.1	6	8.0	0.03
	III	22	4.430	24.1	12	1.1	12	7.8	7.7
	Mean		4.804		9.5	1.1	9	7.9	3.865
08/002	II	7	5.950	18.9	11	1.2	7	6.9	0.1
	III	6	5.690	27.6	10	1.5	6	10.6	0.4
	Mean		5.820		10.5	1.35	6.5	8.75	0.25
02/036	II	9	5.490	22.8	9	1.3	9	8.6	0.2
		14	5.250	27.2	11	1.3	11	10.0	1.3
		21	5.130	23.7	10	1.4	9	6.8	0.3
	III	3	5.870	29.6	10	1.3	10	9.3	0.2
	IV	16	3.270	36.6	6	1.5	6	11.9	3.6
		17	3.110	46.2	6	1.5	6	14.3	0.4
	V	7	2.110	52.3	7	1.4	6	7.9	0.1
		8	1.590	57.0	9	1.3	7	8.3	0.7
	Mean		3.978		8.5	1.375	8	9.638	0.85
03/392	II	11	5.290	24.2	10	1.5	10	9.0	1.3
		15	5.250	24.9	12	1.4	10	8.2	1.6
	III	16	4.690	28.5	9	1.4	7	8.2	1.2
		24	4.250	33.3	10	1.5	10	6.5	1.1
	IV	10	3.910	33.5	5	1.3	3	11.0	1.0
		12	3.870	35.2	10	1.4	5	6.2	1.4
		23	0.050	50.6	9	1.4	9	7.1	5.2
	V	2	4.310	46.1	10	1.2	7	9.9	0.6
	Mean		3.953		9.375	1.388	7.625	8.263	1.675
03/246	II	12	5.290	18.1	5	1.3	4	12.5	0.5
	III	1	6.270	24.2	7	1.0	7	12.4	0.3
	Mean		5.780		6	1.15	5.5	12.45	0.4
04/051	II	18	5.190	27.7	10	1.0	10	10.5	0.3
	IV	14	3.570	42.1	8	1.4	7	10.8	1.0
	Mean		4.380		9	1.2	8.5	10.65	0.65
02/314	III	2	6.130	24.2	8	1.2	8	9.3	0.2
	IV	1	6.650	28.5	9	1.2	8	9.4	0.3
	Mean		6.390		8.5	1.2	8	9.35	0.25

Table 4.25 continues

Sire No.	Par ity	Rank	Index	Age at Farrowing	Litter size at birth	Average weight of a piglet at birth	Litter size at weaning	Average weight of a piglet at weaning	Post weaning conception period
01/037	III	5	5.790	27.2	8	1.0	8	12.4	1.0
		15	4.790	29.9	8	1.0	8	9.3	0.6
	IV	3	5.010	31.4	7	1.3	4	10.0	0.3
	V	4	4.050	48.5	11	1.4	11	6.2	0.8
	Mean		4.910		8.5	1.175	7.75	9.475	0.675
01/184	III	7	5.550	23.7	7	1.3	7	8.2	0.4
	IV	22	0.170	56.4	9	1.3	9	7.0	1.9
	Mean		2.860		8	1.3	8	7.6	1.15
01/140	III	10	5.530	25.6	7	1.0	7	9.9	0.2
		23	4.330	29.7	8	1.3	7	9.9	1.8
	Mean		4.930	27.65	7.5	1.15	7	9.9	1
01/262	III	12	5.270	24.4	6	1.3	6	10.3	0.8
	IV	7	4.570	33.1	10	1.2	5	7.0	1.0
		9	4.150	29.8	5	1.3	5	6.7	1.1
	Mean		4.663		7	1.27	5.53	8	0.97
02/137	III	14	4.870	30.6	8	1.4	5	13.8	1.0
	IV	19	2.510	42.4	8	1.5	6	7.7	1.5
	Mean		3.690		8	1.45	5.5	10.75	1.25
06/018	III	21	4.430	29.5	6	1.3	6	10.2	0.3
	IV	5	4.590	35.3	8	1.3	8	6.6	0.2
		6	4.570	38.0	8	1.2	8	9.1	0.1
	Mean		4.487		7.33	1.27	7.33	8.63	0.2

Table 4.26
Best sow-sire combinations selected based on their composite sow index value

Parity I				Parity II				Parity III				Parity IV				Parity V			
Rank	Sow	Sire	Index	Rank	Sow	Sire	Index	Rank	Sow	Sire	Index	Rank	Sow	Sire	Index	Rank	Sow	Sire	Index
3	07/160	01/182	6.150	2	07/160	01/182	6.490	1	08/098	03/246	6.270	5	06/200	06/018	4.590	7	04/295	02/036	2.110
10	10/160	04/157	5.750	8	10/160	04/157	5.730	3	08/198	02/036	5.870	12	06/298	03/392	3.870				
				12	08/098	03/246	5.290	9	07/160	01/182	5.530	17	04/295	02/036	3.110				
				20	09/150	04/371	5.130	16	06/298	03/392	4.690								
				21	08/198	02/036	5.130	20	09/150	04/371	4.430								
								21	06/200	06/018	4.430								

Table 4.27
Average of the composite sow index and the six charracters of the selected sow-sire combinations

Sow-sire No.	Parity	Rank	Index	Age at Farrowing	Litter size at birth	Average weight Of a piglet at birth	Litter size at weaning	Average weight of a piglet at weaning	Post weaning conception period
07/160 01/182	I II III	3 2 9	6.150 6.490 5.530	12.9 19.4 25.6	7 9 7	1.3 1.0 1.0	7 8 7	13.4 12.1 9.9	0.9 0.5 0.2
	Mean		6.057		8.33	1.1	7.33	11.8	0.53
10/160 04/157	I II	10 8	5.750 5.730	12.7 20.2	9 9	2.0 1.3	9 9	8.5 9.0	1.9 1.1
	Mean		5.740		9	1.65	9	8.75	1.5
08/098 03/246	II III	12 1	5.290 6.270	18.1 24.2	5 7	1.3 1.0	4 7	12.5 12.4	0.5 0.3
	Mean		5.780		6	1.15	5.5	12.45	0.4
09/150 04/371	II III	20 20	5.130 4.430	23.5 31.1	11 10	1.4 1.3	11 8	7.0 8.6	2.0 1.7
	Mean		4.780		10.5	1.35	9.5	7.8	1.85
08/198 02/036	II III	21 3	5.130 5.870	23.7 29.6	10 10	1.4 1.3	9 10	6.8 9.3	0.3 0.2
	Mean		5.500		10	1.35	9.5	8.05	0.25
06/298 03/392	III IV	16 12	4.690 3.870	28.5 35.2	9 10	1.4 1.4	7 5	8.2 6.2	1.2 1.4
	Mean		4.280		9.5	1.4	6	7.2	1.3
06/200 06/018	III IV	21 5	4.430 4.590	29.5 35.3	6 8	1.3 1.3	6 8	10.2 6.6	0.3 0.2
	Mean		4.510		7	1.3	7	8.4	0.25
04/295 02/036	IV V	17 7	3.110 2.110	46.2 52.3	6 7	1.5 1.4	6 6	14.3 7.9	0.4 0.1
	Mean		2.610		6.5	1.45	6	11.1	0.25

Table 4.28

Table of composite sow indices for the sows which are regularly coming under the first three or more parities

Sl no.	Sow no.	Composite sow index					Sl No.	Sow No.	Composite sow index				
		Parity I	Parity II	Parity III	Parity IV	Parity V			Parity I	Parity II	Parity III	Parity IV	Parity V
1	04/196	2.790	-3.350	1.770	0.330		27	08/198	4.330	5.130	5.870		
2	07/199	3.030	2.070	-1.070	0.330		28	06/200	3.970	4.870	4.430	4.590	
3	08/256	1.590	3.330	0.970	-3.390	1.590	29	07/209	4.370	5.250	3.670		
4	03/268	3.050	3.490	3.630	2.510	3.810	30	05/210	4.990	4.390	3.550		
5	04/287	-0.230	0.070	-0.290	0.170		31	04/212	4.450	-0.520	3.310		
6	04/295	1.930	2.830	1.090	3.110	2.110	32	10/233	4.530	4.990	3.630		
7	06/298	5.130	5.490	4.690	3.870	3.370	33	07/271	4.430	4.270	4.330		
8	06/333	0.790	1.370	2.070	0.050		34	07/188	3.150	3.410	3.710		
9	05/341	3.490	4.590	0.390	-0.830		35	03/191	1.730	2.630	2.030		
10	03/353	3.530	2.730	2.970	3.570		36	07/082	2.990	5.110	5.790		
11	06/023	4.630	4.730	2.850	3.270	4.310	37	08/072	2.890	4.010	3.630	3.910	4.050
12	08/023	3.470	-1.830	1.430			38	06/084	4.330	4.818	4.790		
13	04/040	4.410	5.290	-0.070	2.890		39	07/180	2.250	0.950	2.570		
14	08/041	3.910	3.350	3.470			40	02/248	3.730	5.170	2.990		
15	06/137	1.610	5.250	2.070			41	06/255	4.010	3.910	2.930		
16	08/137	3.110	-0.350	4.010			42	04/271	3.490	4.650	3.530		
17	04/141	3.570	5.270	2.570	4.710		43	03/272	3.890	3.410	4.230		
18	05/143	4.210	4.510	5.550	3.910		44	08/098	2.970	5.290	6.270		
19	06/143	3.090	4.390	4.670	4.190		45	06/185	3.470	4.310	2.450		
20	09/150	4.030	5.130	4.430			46	07/160	6.150	6.490	5.530	5.010	4.130
21	09/153	5.850	4.490	4.870			47	06/256	2.390	4.338	4.090		
22	05/162	4.210	3.750	3.190	4.570		48	05/324	4.950	4.370	4.550	4.570	4.690
23	05/164	4.670	4.770	3.910			49	06/301	4.490	4.610	3.430		
24	08/174	2.370	4.250	3.570			50	06/321	-4.230	-1.550	2.950		
25	07/175	4.570	4.130	4.950			51	10/328	4.350	2.330	2.150	3.710	
26	07/177	3.430	3.170	3.610			52	09/209	1.570	3.830	2.170		

Discussion

5. DISCUSSION

The present investigation has been divided into three parts.

In first part, three different types of indices viz.

1. phenotypic index based on one main character and one auxiliary character
2. phenotypic index based on one main character and two auxiliary characters and
3. a composite sow index

were worked out and given in the results.

The second part consisting of the investigation of the effect of climate in farrowing as well as growth of the piglings. For this purpose, the tables were sorted out for the best 25 animals based on the composite sow index and the same has been rearranged on the basis of three seasons viz. winter season (October, November, December and January), summer season (February, March, April and May) and rainy season (June, July, August and September) for different parities and the tables were presented under the results.

The third aspect of this study envisaged was to identify the best sow, sire and sow-sire combination. For this purpose, tables were formed for the best sows which were performing well under more than one parity out of the best 25 selected sows, on the basis of the composite sow index. The performance of these best sows under the six characters studied for varying parities were also enumerated and their average performance under each character was noted. Similar tables were made for best sires and best sow-sire pairs, selected out of the best 25 and their average performance under each character was also noted.

Phenotypic index for one main character and one auxiliary character was independently constructed for all pairs of main and auxiliary characters for each parity as shown in appendix 1(a), 1(b), 1(c), 1(d) and 1(e). Under each parity, indices were also worked out by taking the mean values of the main and auxiliary characters as given in table 4.4. Variance of these indices were found and for comparison with other indices, average of the 8 variances were also calculated and were given in table 4.5. The efficiency from among the 8 indices were worked out as given in table 4.6. From this table, it is evident that the main characters viz. age at farrowing and post weaning conception period had a very good bearing on litter size and average weight of a piglet at the time of weaning. The samething could be observed from all the five parities. Hence it can be generally concluded that litter size and average weight of a piglet at weaning time are the most economically viable and productive characters in combination with age at farrowing and post weaning conception period.

Four phenotypic indices were calculated by taking one main character and two auxiliary characters as shown in appendix 2(a), 2(b), 2(c), 2(d) and 2(e).These indices were also worked out based on the mean values of main and auxiliary characters as shown in table 4.8. Variance of the indices based on the mean values of main and auxiliary characters and the average value of these four variances under each parity were calculated as given in table 4.9. Efficiencies for these 4 indices were worked out on the basis of the variances as shown in table 4.10. As in the case of phenotypic index with one main character and one auxiliary character, here also, age at farrowing and post weaning conception period showed a significant bearing on litter size and average weight of a piglet at the time of weaning, for all the five parities. Hence these two indices corraborates the importance of the characters

litter size and average weight of a piglet at weaning time in combination with the age at farrowing and post weaning conception period.

In both these phenotypic indices, all the characters were not simultaneously considered. Hence for comparison purposes, the average values of the variances were considered. This could be taken as one of the drawbacks of these two indices. In order to avoid the above mentioned defect, a composite sow index of the form mentioned in the materials and methods viz. $I = I_a + I_b + I_c + I_d + I_e + I_f$ by taking into account all the six characters simultaneously giving proper weightage to each character was considered.

It is generally seen that the normal age at first farrowing for a healthy sow is of 12 months duration. Hence, a score I_a for age at first farrowing was obtained by $I_a = 1 + (12 - X_1)0.2$ where X_1 is the age at first farrowing. Similarly, the normal litter size at birth is 8. Hence a score I_b for litter size at birth was obtained by $I_b = 1 + (X_2 - 8)0.2$ where X_2 is the litter size at birth. By experience, it was observed that the overall litter weight at birth is 10 Kg. Hence an appropriate birth weight of a piglet can be considered as 1.25 Kg. Hence a score for average weight of a piglet at the time of birth could be derived as $I_c = 1+ (X_3 - 1.25)0.2$ where X_3 is the average weight of a piglet at birth. Generally, it was observed that the litter size at weaning is 8. Hence a score I_d for litter size at weaning was given by $I_d = 1 + (X_4 - 8)0.2$ where X_4 is the litter size at weaning. The litter weight at weaning is approximately 72 Kg. normally. Hence the average weight of a piglet at the time of weaning can be taken as 9 Kg. A score I_e for average weight of a piglet at weaning time was worked out by $I_e = 1 + (X_5 - 9)0.2$ where X_5 is the average weight of a piglet at the time

of weaning. Normally, for a standard sow, the post weaning conception period is a fortnight. Hence, a score I_f for post weaning conception period was given by $I_f = 1 + (1 - X_6)0.2$ where X_6 is the post weaning conception period on fortnight basis. The composite sow index was constructed by adding the above six items, since all the six characters were considered as independent and equally important. The age at farrowing changes from parity to parity. Hence suitable adjustment has been made while calculating this index for different parities. The indices were given in appendix 3(a), 3(b), 3(c), 3(d) and 3(e). The variance of the composite sow index was also calculated as shown in table 4.11 based on the mean values of the six contributing characters. This variance was compared with the average variances of the two types of the phenotypic indices. It was seen that for all parities, the variance of the composite sow index was less than the average variances of the other two indices and hence can be considered as more efficient. Therefore the remaining analysis has been done on the basis of the composite sow index.

Best 25 sow-sire combinations were worked out based on the most efficient index (composite sow index) and corresponding ranks for these combinations under other indices (if it is within 25) were given in tables 4.12, 4.13, 4.14, 4.15 and 4.16. The sow-sire combinations 05/047-02/051, 09/153-01/138, 10/160-04/157, 06/205-01/091 and 07/295-01/138 were showing good performance in most of the three types of indices in parity I. In parity II, the pairs 02/004-08/002, 04/040-03/392, 07/209-03/392, 09/150-04/371 and 08/166-03/246 were performing well. The pairs 08/198-02/036, 11/265-08/002, 07/175-04/371, 07/218-02/209 and 03/331-03/392 gave good results in most of the indices in third parity. Under parity IV, 05/308-02/314, 06/143-01/038, 08/072-04/017, 03/353-04/051 and

05/184-03/312 had good ranks. For fifth parity, 07/160-02/038, 08/072-01/037 and 03/268-02/143 performed well. These combinations gave consistent results for most of the 13 indices and hence they can be treated as best pairs.

Based on the date of farrowing, the best performing 25 sow-sire pairs were classified into three seasons, for all the five parities. Average of the index values coming under each season for each parity was also calculated as shown in tables 4.17, 4.18, 4.19, 4.20 and 4.21. For first parity, maximum number of sow-sire pairs was found in summer season, but average value of the index was slightly more in rainy season. The average index values of the three seasons viz. winter season, summer season and rainy season were found to be 5.7585, 5.5667 and 5.7820 respectively. Under second parity, equal number of sow-sire pairs came under winter and summer seasons. Maximum average value was obtained for summer season. The values of the average indices for the three different seasons viz. winter season, summer season and rainy season were 5.5960, 5.6760 and 5.3100 respectively for parity II. Under parity III, maximum number came under summer season but maximum average value of the index obtained was in the winter season. The average indices for winter season, summer season and rainy season were respectively 5.5800, 4.9482 and 4.9725. In parity IV, the case was reversed so that maximum number was seen under winter season and maximum average value was obtained for summer season. The average values of the indices were 2.8315, 3.3500 and 3.0950 for winter season, summer season and rainy season respectivly. For fifth parity, maximum number of sow-sire pairs came under rainy season and average index was maximum for summer season. The average index values for the three seasons viz. winter season, summer season and rainy season were found to be 4.0600, 4.1300 and 3.2240

respectively. In order to find out the significant difference among these indices sorted out on the basis of seasons, an analysis of variance was worked out for the first four parities (the fifth parity was not included for analysis of variance as the number of animals under each season were not sufficient) as given in table 5.1, ~~5.2, 5.3, and 5.4~~. From this table, it was found that there was no significant difference with respect to the indices among seasons in any of the parities. Hence it could be reasonably concluded that season is not having any effect on any of the six contributing characters namely, age at farrowing, litter size at birth, average weight of a piglet at birth, litter size at weaning, average weight of a piglet at weaning, and post weaning conception period.

From the best performing 25 sows selected based on their composite sow index, selection was done again for the sows showing good performance in more than one parity as shown in table 4.22. From the tables 4.22 and 4.23, it was observed that the sows 07/160, 06/298 and 05/324 were giving consistent performance. Among these three sows, 07/160 gave consistently good index values for all the five parities. The average values obtained for the sow 07/160 were 7.2 (numbers), 1.22Kg., 6.4 (numbers), 11.18 Kg. and 1.06 fortnights respectively for the characters litter size at birth, average weight of a piglet at birth, litter size at weaning, average weight of a piglet at weaning and post weaning conception period and which were almost near to the normal conditions. The average index value was 5.462 which was also nearer to normal value. The age at farrowing for all the five parities were 12.9, 19.4, 25.6, 31.4 and 37.3 months respectively which were also almost near to the normal conditions. Hence the sow 07/160 can be selected as the best sow

From the tables 4.24 and 4.25, it was found that the sires 01/091, 01/182 and 01/138 were performing well. Out of these 01/182 was more consistent and had come under the first three parities where as the other two were having one parity missing when we considered best 25 on the basis of the composite sow index. 01/091 was performing better in most of the characters under consideration except average weight of a piglet at weaning and post weaning conception period in comparison to 01/182. But the main drawback of this is that it has come under only two parities, within the specified rank. Hence it is inferior to 01/182, but better than 01/138. Therefore the sire 01/182 can be considered as the best out of all the sires. Average values obtained for index, litter size at birth, average weight of a piglet at birth, litter size at weaning, average weight of a piglet at weaning and post weaning conception period of the sire 01/182 were respectively 6.057, 7.67 (numbers), 1.1 Kg., 7.33 (numbers), 11.8 Kg. and 0.53 fortnights. The farrowing ages were 12.9, 19.4 and 25.6 months respectively for first, second and third parities. All these were nearer to the normal values for each of the character.

From tables 4.26 and 4.27 it could be observed that the best sow-sire combination was 07/160-01/182. This combination was consistently performing better in the first three parities with average values for index, litter size at birth, average weight of a piglet at birth, litter size at weaning, average weight of a piglet at weaning and post weaning conception period as 6.057, 8.33 (numbers), 1.1 Kg., 7.33 (numbers), 11.8 Kg. and 0.53 fortnights respectively. The age at farrowing was also 12.9, 19.4 and 25.6 months respectively for the first, second and third parities. Hence all the six characters are almost in agreement with the normal values for a standard sow-sire combination.

In order to find out the best parity, the details obtained in table 4.28 were considered and it was found from this table that the average index (composite sow index) was higher in the second parity in comparison to the other parities. The significant difference of the indices of first three parities were tested by means of analysis of variance as given in table 5.5 and it was found that there is no significant difference between the mean indices of the three parities. The fourth and fifth parities could not be considered as there were few observations under each. Hence it could be reasonably concluded that there is no preference of one parity over the other for considering the economic importance of the animals.

The standard value for a composite sow index should be around six since it was selected as the most efficient index. The sows which are having the composite sow index value below six are to be culled and those having composite sow index value nearer or above six are to be retained for further breeding. Hence based on the index values, culling can be suggested for the uneconomic animals.

Table 5.1

Analysis of variance table to test the significance difference among the composite sow indices sorted out on the basis of seasons

Source	Degrees of Freedom	Mean Sum of Squares			
		Parity I	Parity II	Parity III	Parity IV
Between	2	0.127	0.229	0.882	0.466
Within	22	0.237	0.447	0.358	5.770

Table 5.2

Analysis of variance table to test the significance difference among the composite sow indices sorted out on the basis of parities

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Between	2	1.761	0.881	< 1
Within	153	484.932	3.169	
Total	155	486.693		

Summary

6. SUMMARY

The present investigation - construction of a composite sow index and study of its effects due to sire, parity and season in pigs - has been undertaken with the following objectives.

1. Construction of a composite sow index for pigs
2. To study the influence of sire, parity and season on this index
3. Also to suggest, based on the index, for culling the uneconomic animals.

For this purpose 255 pigs under the first parity were selected from the University Pig Breeding Farm, Mannuthy. The data on the following six characters viz. age at farrowing, litter size at birth, average weight of a piglet at birth, litter size at weaning, average weight of a piglet at weaning and post weaning conception period were noted. Also the same have been noted for the subsequent parities available from the 255 animals already selected. There were data available for 126 animals in the second parity, 71 animals in the third parity, 25 animals in the fourth parity and 8 animals in the fifth parity from among the 255 animals selected under the first parity.

Three different types of selection indices namely, phenotypic index with one main character and one auxiliary character, phenotypic index with one main character and two auxiliary characters and composite sow index were worked out based on the data collected. For phenotypic index with one main character and one auxiliary character, eight different combinations were obtained and for each of them, indices based on the mean values were also worked out under each parity. The variances were worked out for each of these indices under

each parity. For the phenotypic index with one main character and two auxiliary characters, four different combinations were obtained and the indices were worked out based on the mean values also. For each parity, variances of the four indices were also worked out. While comparing the 8 indices based on one main character and one auxiliary character, it was found that the indices based on the characters litter size at weaning and average weight of a piglet at weaning were highly efficient and the same has been repeated when we considered one main character and two auxiliary characters simultaneously. Hence it could be concluded that the litter size at weaning and the average weight of a piglet at the time of weaning are the most contributing characters in combination with age at farrowing and post weaning conception period. As these two indices do not consider all the characters simultaneously, a composite sow index was calculated by considering each of the six characters independently and by giving appropriate weights to each of them. variances of this index under each parity were also worked out. For comparing the three different indices within and between, the average of the variances of the 8 indices under the first case and 4 indices under the second case were also worked out and these values were compared with the variances of the composite sow index. The variances of the composite sow index was found to be less than that of the other two indices and hence the composite sow index was proved to be more efficient than the other two indices.

The best 25 sow-sire combinations were sorted out based on the composite sow index. The corresponding ranks for these combinations (if it is within 25) were also noted for the other two indices and the pairs for which three of the indices performing well were also noted.

The effect of season on various characters considered were tested using the composite sow index. For this, the best 25 sow-sire pairs selected were classified into three seasons namely, winter season, summer season and rainy season for all the five parities. The average index coming under each season for each parity were calculated and compared. The mean indices were not very much varying. In order to test the significant differnce among these indices for various seasons, an analysis of variance was performed and it was found that there was no significant difference among the average indices of the three seasons under the four parities. Hence it was reasonably concluded that there is no seasonal effect for any of the six characters under consideration. The sows repeated in more than one parity were sorted out from the best ranking 25 sows, based on their composite sow index values. For the selected sows, the average value of the index under differnt parities and the average values for each of the characters considered were found out except for the age at farrowing. The ages at different farrowings, the average value of the index and also the average values for the other contributing characters were found to be nearer to those of the standard values, for the sow 07/160. This sow came under all the five parities. Hence 07/160 was selected as the best sow. In a similar manner, best sire was selected and the selected sire was 01/182. The best sow-sire pair selected by this method was 07/160-01/182.

To find out the best parity, sows coming under at least first three parities were sorted out on the basis of composite sow index. The average values for each parity were found and compared. The average index value obtained for the second parity was found to be slightly greater than that of the other parities. The analysis of variance of the indices for the various parities was also worked out and no significant difference between the average indices among

the different parities was found. Hence it was concluded that there is no effect of parity with regard to the six contributing charaters considered.

As the composite sow index was found to be the best among the three indices, the standard value for a composite sow index should be around 6. If any sow is far below this standard index value, it can be culled from further breeding. On the other hand, if the sow shows an index nearer or above 6, it can be retained for further breeding purposes.

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Appendices

Appendix 1(a)

Phenotypic index (I = Y - bX) of pigs based on one main character and one auxiliary character in the first parity

Sl. No.	Dam no.	Sire no.	I_1:Y_1 Vs X_1	I_2:Y_1 Vs X_2	I_3:Y_2 Vs X_1	I_4:Y_2 Vs X_2	I_5:Y_3 Vs X_1	I_6:Y_3 Vs X_2	I_7:Y_4 Vs X_1	I_8:Y_4 Vs X_2
1.	04/196	04/051	9.6525	10.0106	1.4230	1.2998	8.8569	10.0022	9.7912	10.4841
2.	07/199	04/172	4.7363	5.0169	1.2934	1.1996	3.1325	4.0035	14.7621	15.2745
3.	08/256	01/182	7.8201	8.1559	1.0637	0.9961	6.4081	7.0321	7.0330	7.1641
4.	03/268	04/172	6.8118	7.1265	1.0667	0.9968	6.3808	7.0265	13.5161	13.7055
5.	04/287	01/182	1.8076	2.2317	1.2681	1.1942	1.3672	2.0477	17.1077	17.2493
6.	04/295	01/037	8.7290	9.0548	1.5959	1.4987	5.1087	6.0113	7.2473	7.7171
7.	06/298	01/182	7.8294	8.0169	1.1604	1.0996	7.4387	8.0035	9.5520	9.8745
8.	06/333	02/038	7.7756	8.1770	1.3795	1.2956	6.2618	7.0364	8.9425	9.1322
9.	05/341	03/265	3.8014	4.0085	1.4703	1.3998	3.3468	4.0018	10.8950	11.2875
10.	03/353	02/036	8.8076	9.0674	1.4681	1.3946	6.3672	7.0139	8.1077	8.3990
11.	06/023	04/371	8.8159	9.0232	1.4652	1.3995	6.3944	7.0048	8.6245	8.9650
12.	08/023	01/184	9.8221	10.0906	1.4630	1.3978	6.4149	7.0187	7.6372	7.8629
13.	04/027	04/371	7.8252	8.0443	1.4619	1.3989	5.4251	6.0091	8.1435	8.4331
14.	04/040	02/036	7.8211	8.0295	1.5634	1.4993	7.4115	8.0061	7.5351	7.8554
15.	08/041	03/031	7.7704	8.0169	1.5813	1.4996	6.2448	7.0035	9.6317	10.0745
16.	04/042	02/036	7.7983	8.2380	1.5714	1.4940	5.3366	6.0490	9.0887	9.1397
17.	04/115	03/392	5.6463	6.1075	1.4252	1.2973	4.8385	6.0221	7.5786	8.1376
18.	06/137	02/143	7.7911	8.1601	1.5740	1.4960	5.3128	6.0329	10.7739	10.9577
19.	08/137	02/037	5.7849	6.0253	1.5762	1.4994	4.2924	5.0052	9.0613	9.4618
20.	05/139	04/371	8.8252	9.1096	1.5619	1.4973	6.4251	7.0226	9.1435	9.3342
21.	06/140	04/371	6.8635	7.0190	1.5486	1.4996	3.5510	6.0039	8.2216	8.4714
22.	04/141	03/031	1.8656	2.0253	1.5476	1.4994	0.5578	1.0052	11.7258	11.9618
23.	05/143	02/036	4.8521	5.0464	1.5524	1.4989	3.5135	4.0096	12.1984	12.4299
24.	06/143	02/137	4.8190	5.0506	1.5641	1.4988	4.4047	5.0104	9.1309	9.4235
25.	04/144	02/143	10.8263	11.1896	1.5615	1.4953	2.4285	3.0390	11.0456	11.1131
26.	05/144	03/392	7.7539	8.0064	1.3871	1.2999	7.1903	8.0013	7.0380	7.5905
27.	08/146	02/137	7.7083	8.0527	1.5033	1.3987	6.0406	7.0109	7.1052	7.6203
28.	09/150	03/392	7.8201	8.0127	1.5637	1.4997	4.4081	5.0026	7.1330	7.4809
29.	06/153	01/138	5.7849	6.2675	1.5762	1.4933	5.2924	6.0550	8.4613	8.4951
30.	09/153	01/138	11.8211	12.0274	1.4634	1.3994	10.4115	11.0057	7.6351	7.9586
31.	04/155	01/184	7.7849	8.2528	1.4762	1.3937	6.2924	7.0520	9.4613	9.5174
32.	05/162	01/184	7.8221	8.0106	1.5630	1.4998	5.4149	6.0022	6.6372	6.9841
33.	05/164	01/140	6.8221	7.0211	1.5630	1.4995	5.4149	6.0044	10.9372	11.2682
34.	07/166	04/371	6.7870	7.0106	1.5754	1.4998	5.2992	6.0022	9.7655	10.1841
35.	07/171	02/143	1.7942	2.1054	1.5729	1.4974	0.3230	1.0217	8.5802	8.8406
36.	08/174	02/036	4.8087	5.1201	1.4678	1.3970	4.3706	5.0247	13.2098	13.4183
37.	07/175	02/036	7.8159	8.0085	1.5652	1.4998	5.3944	6.0018	8.8245	9.1873
38.	07/177	03/392	5.8190	6.0485	1.5641	1.4988	5.4047	6.0100	8.6309	8.9267
39.	08/198	03/392	8.8211	9.0211	1.5634	1.4995	6.4115	7.0044	6.3351	6.6682
40.	06/200	02/137	4.8304	5.0043	1.4601	1.3999	4.4421	5.0009	8.1541	8.4937
41.	03/208	04/371	4.7963	5.0801	1.5721	1.4980	3.3298	4.0165	11.3845	11.6789
42.	07/209	04/051	8.8325	9.0696	1.4593	1.3983	8.4489	9.0143	8.1583	8.3948
43.	05/210	01/140	8.8221	9.0148	1.4630	1.3997	7.4149	8.0031	8.0372	8.3777
44.	09/211	02/143	8.7849	9.0169	1.4762	1.3996	3.2924	4.0035	6.6613	7.0745
45.	04/212	04/371	7.8304	8.0211	1.5601	1.4995	7.4421	8.0044	6.0541	6.3682
46.	10/233	04/373	8.8345	9.0253	1.5586	1.4994	5.4557	6.0052	7.4625	7.7618
47.	09/237	02/137	5.8211	6.0169	1.5634	1.4996	5.4115	6.0035	8.2351	8.5745
48.	08/250	01/138	5.8108	6.0443	1.5670	1.4989	3.3774	4.0091	11.6140	11.9331
49.	06/252	03/392	4.7808	5.0527	1.4776	1.3987	4.2788	5.0109	14.7528	15.1203
50.	07/271	02/137	5.8263	6.0211	1.7615	1.6995	5.4285	6.0044	10.1456	10.4682
51.	04/273	02/036	6.7435	7.0337	1.4908	1.3992	6.1563	7.0070	10.1769	10.6490
52.	08/280	01/138	6.8325	7.2570	1.3593	1.2936	5.4489	6.0529	9.5583	9.5110
53.	07/287	03/392	7.8108	8.0085	1.4670	1.3998	7.3774	8.0018	7.0140	7.3873
54.	06/288	04/051	7.8118	8.0064	1.8667	1.7999	3.3808	4.0013	10.5161	10.8905
55.	04/291	03/031	6.7849	5.0316	1.4762	1.3993	4.2924	5.0065	9.2613	9.6522
56.	06/294	04/371	5.7901	6.0022	1.4743	1.4000	4.3094	5.0005	12.1718	12.5969
57.	07/295	01/138	10.7994	11.0064	1.3710	1.2999	10.3400	11.0013	5.7908	6.1905
58.	07/298	03/392	2.8139	3.1159	1.4659	1.3971	2.3876	3.0239	10.3203	10.5247
59.	07/306	02/137	3.8076	4.0169	1.5681	1.4996	2.3672	3.0035	9.1077	9.4745
60.	08/310	02/143	6.8128	7.0190	1.5663	1.4996	4.3842	5.0039	5.6182	5.9714
61.	05/313	01/138	5.8159	6.0422	1.5652	1.4990	5.3944	6.0087	13.6245	13.9363
62.	06/313	04/371	5.8076	6.0674	1.5681	1.4984	4.3672	5.0139	8.8077	7.0980
63.	08/318	03/392	5.8159	6.0759	1.4692	1.3981	5.3944	6.0156	6.0245	6.2853
64.	07/319	01/138	6.8159	5.0359	1.5652	1.4991	3.3966	4.0074	8.1245	8.4459
65.	07/321	02/143	7.8356	8.0464	1.4582	1.3989	7.4591	8.0096	5.8646	6.1299
66.	03/335	02/143	7.8387	8.0127	1.4571	1.3997	7.4693	8.0026	8.3710	8.6809
67.	11/340	02/143	9.8211	10.0611	1.4634	1.3985	9.4115	10.0126	6.9351	7.2076
68.	10/367	02/143	7.8418	8.0043	1.4560	1.3999	5.4795	6.0009	6.9773	5.2937
69.	07/375	02/036	10.8283	11.0190	1.2608	1.1996	3.6353	4.0039	8.5499	8.8714
70.	07/376	01/138	3.7962	4.0422	1.4729	1.3990	3.33	4.0087	11.1802	11.5363
71.	07/380	01/184	7.7787	8.0169	1.3784	1.2996	4.2720	5.0035	7.1486	7.5745
72.	06/390	03/011	9.8035	10.0043	1.4696	1.3999	5.3536	6.0009	8.4992	8.8937
73.	07/023	01/140	9.8470	10.0085	1.3542	1.2998	5.4965	6.0018	5.3878	5.6873
74.	08/029	01/040	4.8263	5.0106	1.3615	1.2998	2.4285	3.0022	6.6456	6.9841
75.	08/034	02/143	8.8097	9.0359	1.3674	1.2991	8.3740	9.0074	6.6119	6.9458
76.	07/038	03/006	8.8118	9.0337	1.3667	1.2992	7.3808	8.0070	7.9161	8.2490
77.	06/040	01/003	4.8159	5.0316	1.4652	1.3993	4.3944	5.0065	8.4245	8.7522
78.	04/044	03/392	8.8087	9.0274	1.2678	1.1994	6.3706	7.0057	7.3098	7.6586
79.	09/046	02/143	7.8170	8.0148	1.4648	1.3997	6.3979	7.0031	7.8267	8.1777
80.	06/067	02/143	7.8252	8.0064	1.4619	1.3999	7.4251	8.0013	8.1435	8.4905
81.	06/069	02/143	2.8697	3.0443	1.4462	1.3989	2.5714	3.0091	12.4342	12.6331
82.	06/070	02/143	7.8366	8.0569	1.4579	1.3986	7.4625	8.0117	5.2667	5.5140
83.	05/071	02/143	4.8418	5.0043	1.4560	1.3999	4.4795	5.0009	10.2773	10.5937
84.	05/073	02/143	4.8676	5.0211	1.4469	1.3995	1.5646	2.0044	10.7300	10.9682
85.	07/082	01/140	8.8490	9.0485	1.4535	1.3988	7.5033	8.0100	6.0921	6.3267
86.	04/087	03/011	7.8459	8.0359	1.4546	1.3991	4.4931	5.0074	9.6857	9.9458
87.	06/104	01/003	6.8563	7.0337	1.3509	1.2992	3.5271	4.0070	10.0068	10.2490
88.	07/253	02/038	6.8211	7.0843	1.0634	0.9979	5.4115	6.0174	8.1351	8.3725
89.	04/258	04/172	7.8128	8.0696	1.1663	1.0983	7.3842	8.0143	9.0182	9.2948
90.	02/248	02/038	4.8045	5.1496	1.0692	0.9963	4.3570	5.0308	11.4013	11.5737

Appendix 1(a) continues

Sl. No.	Dam no.	Sire no.	I_1:I_1 Vs X_1	I_2:I_1 Vs X_2	I_3:I_2 Vs X_1	I_4:I_2 Vs X_2	I_5:I_3 Vs X_1	I_6:I_3 Vs X_2	I_7:I_4 Vs X_1	I_8:I_4 Vs X_2
91.	03/183	01/056	8.8097	9.0148	1.0674	0.9997	7.3740	8.0031	12.7119	13.0777
92.	05/168	01/182	8.8821	9.0696	1.2418	1.1983	5.6122	6.0143	9.2596	9.3948
93.	06/187	04/172	6.7621	7.1285	1.0842	0.9968	6.2175	7.0265	10.5149	10.8055
94.	07/188	01/037	5.7621	6.0045	1.0842	0.9998	5.2175	6.0018	9.3149	9.7873
95.	02/191	01/182	5.7735	6.0759	1.0802	0.9981	5.2550	6.0156	9.7381	10.0853
96.	02/043	02/036	7.8066	8.0106	1.5685	1.4998	7.3638	8.0022	7.4056	7.7841
97.	06/283	01/184	9.7094	10.0401	1.5029	1.3990	5.0440	6.0083	5.4073	5.9395
98.	06/287	01/056	7.7963	8.0801	1.2721	1.1980	7.3298	8.0165	10.1845	10.4789
99.	04/232	04/172	8.7983	9.0064	1.1714	1.0999	7.3366	8.0013	9.3887	9.7905
100.	06/331	01/037	7.8056	8.0127	1.2689	1.1997	5.3604	6.0028	9.8035	10.1809
101.	06/253	03/051	7.7985	8.0253	1.1714	1.0996	5.3366	6.0052	10.7887	11.1638
102.	06/256	02/038	2.7383	3.0211	1.2926	1.1995	2.1393	3.0046	16.1663	16.6682
103.	07/009	01/182	4.7890	5.0316	1.1747	1.0993	4.3060	5.0063	11.9697	12.3522
104.	06/034	04/172	3.8418	4.0232	1.1560	1.0995	3.4795	4.0048	8.1773	8.4650
105.	03/374	01/182	6.7414	7.0337	1.2915	1.1992	6.1495	7.0070	11.3727	11.8490
106.	04/201	03/179	7.7859	8.0632	1.0758	0.9985	7.2958	8.0130	11.3634	11.7044
107.	06/047	01/326	5.8408	6.1622	1.3564	1.2960	4.4761	5.0334	7.2752	7.3545
108.	07/373	02/160	2.7725	3.0064	1.2808	1.1999	1.2516	2.0013	9.5359	9.9905
109.	06/340	04/172	5.7911	6.1054	1.3760	1.2974	5.3128	6.0217	9.9739	10.2406
110.	05/005	01/037	7.8170	8.0653	1.4648	1.3984	7.3979	8.0135	8.6267	8.9012
111.	10/351	02/036	3.7952	4.1011	1.6725	1.3975	3.3264	4.0208	11.6824	11.9470
112.	03/284	01/184	5.6856	6.0759	1.6113	1.4981	4.9658	6.0156	6.5587	7.0853
113.	04/358	02/036	4.8470	5.0043	1.2542	1.1999	4.4965	5.0009	7.4878	7.7937
114.	07/284	01/054	5.7828	6.1812	1.3769	1.2955	5.2856	6.0373	10.9570	11.1258
115.	07/287	01/054	5.7414	6.0043	1.3915	1.2999	5.1495	6.0009	9.7727	10.2937
116.	07/189	01/037	5.7445	6.0443	1.1904	1.0989	2.1597	3.0091	13.4790	13.9351
117.	03/191	01/037	1.7383	2.0106	1.2926	1.1998	1.1393	2.0022	12.4663	12.9841
118.	07/082	01/410	2.8687	3.0464	1.1465	1.0989	2.5690	3.0096	7.9321	8.1299
119.	08/072	01/037	6.7466	7.0106	1.0897	0.9998	5.1665	6.0022	8.6832	9.1841
120.	08/085	03/088	4.7723	5.0253	1.1806	1.0994	4.2516	5.0052	11.7359	12.1618
121.	02/091	03/088	5.7725	6.0064	1.1806	1.0999	5.2516	6.0013	10.6959	11.0905
122.	06/105	03/088	6.8625	7.1791	1.2487	1.1955	6.5476	7.0368	13.0195	13.0290
123.	05/115	04/172	3.8273	4.0337	1.4612	1.3992	2.4319	3.0070	8.6478	8.9490
124.	06/090	03/088	5.8314	6.0380	1.2597	1.1991	5.4455	6.0078	9.8562	10.1427
125.	05/082	03/088	6.8728	7.1980	1.1451	1.0951	6.5816	7.0407	4.9406	4.9003
126.	07/117	01/182	2.8304	3.0064	1.3601	1.2999	2.4421	3.0013	17.3541	17.6905
127.	06/084	01/037	6.8252	7.0380	1.2619	1.1991	6.4251	7.0078	9.8435	10.1427
128.	06/202	01/182	6.7725	7.0007	1.0806	1.0000	6.2516	7.0002	8.6359	9.0991
129.	03/005	01/184	5.8118	6.0085	1.5667	1.4998	5.3808	6.0018	8.9161	9.2873
130.	07/294	02/036	7.7445	8.0064	1.3904	1.2999	7.1597	8.0013	7.5790	8.0905
131.	05/023	04/371	9.8459	10.0527	1.4546	1.3987	9.4931	10.0109	7.6857	7.9203
132.	06/338	02/038	7.7828	8.0190	1.3769	1.2996	7.2856	8.0039	10.4570	10.8714
133.	07/180	02/036	2.7083	3.0022	1.3033	1.2000	2.0406	3.0005	15.1052	13.6969
134.	05/328	01/179	7.5149	8.0717	1.5717	1.3982	6.4044	8.0148	8.8107	9.6916
135.	05/184	04/172	5.7859	6.1138	1.0758	0.9972	5.2958	6.0234	11.4634	11.7279
136.	02/248	02/038	4.8045	5.0211	1.0692	0.9995	4.3570	5.0044	11.4013	11.7682
137.	07/253	02/038	6.8211	7.0843	1.0634	0.9979	5.4115	6.0176	8.1351	8.3725
138.	06/255	02/036	9.7870	10.0590	1.1754	1.0986	8.2992	9.0122	8.9655	9.3108
139.	05/256	03/051	7.7952	8.0232	1.1725	1.0995	7.3264	8.0048	9.4824	9.8650
140.	04/271	04/172	7.7921	8.0422	1.1736	1.0990	7.3162	8.0087	7.2760	7.6363
141.	03/272	02/038	6.7808	7.0211	1.2776	1.1995	6.2718	7.0044	10.2528	10.6682
142.	08/166	01/410	6.8718	7.0738	1.3654	1.2982	6.5782	7.0152	9.5385	9.6884
143.	06/196	03/246	3.8004	4.0043	1.1707	1.0999	3.3436	4.0009	10.0929	10.4937
144.	08/098	05/160	2.8956	3.0527	1.2370	1.1987	2.6564	3.0109	5.7870	5.9203
145.	09/082	03/246	4.8501	5.0422	1.1531	1.0990	4.5067	5.0087	12.8942	13.1363
146.	05/085	02/160	1.8770	2.2654	1.1436	1.0934	1.5952	2.0546	11.2490	11.0983
147.	08/382	03/169	1.8221	2.1243	1.1630	1.0969	1.4149	2.0256	16.1972	16.3119
148.	07/340	05/249	0.7808	1.0085	1.0776	1.7998	0.2788	1.0018	17.0528	17.4873
149.	06/371	05/083	4.8325	5.0359	1.2593	1.1991	4.4489	5.0074	9.1583	9.4458
150.	05/015	01/326	5.8314	6.0106	1.2597	1.1998	0.4455	1.0022	13.6562	13.9841
151.	04/373	03/088	5.7963	6.0464	1.3721	1.2989	5.3298	6.0096	9.2845	9.6299
152.	04/322	03/169	6.7580	7.1075	1.3857	1.2973	6.2039	7.0221	8.8064	9.1374
153.	08/375	03/088	4.7414	5.0232	1.1915	1.0995	3.1495	4.0048	10.7727	11.2650
154.	04/247	05/249	4.6504	5.0085	1.3237	1.1998	3.8501	5.0018	5.6870	6.3873
155.	04/341	04/172	6.7663	7.0106	1.3818	1.2998	6.2311	7.0022	6.9233	7.3841
156.	09/343	05/160	5.7670	6.0274	1.3754	1.2994	5.2992	6.0057	8.8655	9.2586
157.	06/376	02/160	5.8252	6.1096	1.3619	1.2973	5.4251	6.0226	7.6435	7.8342
158.	07/382	02/160	7.7952	8.0022	1.2725	1.2000	6.3264	7.0005	7.2824	7.6969
159.	05/025	01/262	5.8408	6.0443	1.3564	1.2989	5.4761	6.0091	7.3752	7.6331
160.	05/030	01/381	7.8532	8.0843	1.3520	1.2979	7.5169	8.0174	9.4005	9.5725
161.	05/063	01/381	2.7870	3.0043	1.5754	1.4999	2.2992	3.0009	9.5655	9.9937
162.	10/069	05/249	6.5128	7.0632	1.4724	1.2985	5.3976	7.0130	7.6064	8.5044
163.	12/027	01/262	9.7756	10.0548	1.2795	1.1987	9.1618	10.0113	6.8423	7.2171
164.	08/086	01/410	6.8170	7.0043	1.2648	1.1999	4.3979	5.0009	7.7267	8.0937
165.	08/409	01/318	2.9214	3.0064	1.3279	1.2999	2.7415	3.0013	13.0397	13.1905
166.	08/023	01/381	2.8563	3.0759	1.5509	1.4981	2.5271	3.0156	13.7068	13.8853
167.	06/200	01/182	4.7549	5.2759	1.1868	1.0931	4.1937	5.0568	10.1001	10.1823
168.	06/022	01/410	0.8366	1.0022	1.3579	1.3000	0.4625	1.0005	9.6667	9.9969
169.	08/048	02/318	4.8490	5.0190	1.4535	1.3996	2.5033	3.0039	10.0921	10.3714
170.	08/008	02/321	7.7290	8.0380	1.3959	1.2991	7.1087	8.0078	7.9473	8.4427
171.	08/061	02/015	8.7839	9.0106	1.2765	1.1998	8.2890	9.0022	6.5592	6.9841
172.	08/067	02/015	5.8690	6.0548	1.4535	1.3987	5.5033	6.0113	9.1921	9.4171
173.	07/028	01/381	6.8480	7.0085	1.3538	1.2998	6.4999	7.0018	8.6899	8.9873
174.	07/044	01/326	5.7342	6.0674	1.4729	1.3984	5.3230	6.0139	9.9802	10.2980
175.	07/082	01/318	4.8470	5.0190	1.3542	1.2996	4.4965	5.0039	9.6878	9.9714
176.	06/008	01/262	4.8087	5.1559	1.6678	1.5961	4.3706	5.0321	11.6098	11.7641
177.	03/331	03/179	7.8014	8.1222	1.3703	1.2970	7.3468	8.0252	9.5950	9.8151
178.	06/185	01/037	4.8190	5.0527	1.1641	1.0987	4.4047	5.0109	11.6309	11.9203
179.	07/160	01/182	6.8666	7.0190	1.3473	1.2996	6.5612	7.0039	13.1279	13.3714
180.	06/101	04/172	5.8159	6.0211	1.3652	1.2995	5.3944	6.0044	11.9245	12.2682

Appendix 1(a) continues

Sl. No.	Dam no.	Sire no.	I_1:I_1 Vs I_1	I_2:I_1 Vs I_2	I_3:I_2 Vs I_1	I_4:I_2 Vs I_2	I_5:I_3 Vs I_1	I_6:I_3 Vs I_2	I_7:I_4 Vs I_1	I_8:I_4 Vs I_2
181.	06/174	03/006	6.8718	7.0738	1.3454	1.2982	6.5782	7.0152	9.5385	9.6884
182.	06/256	02/038	2.7983	3.0274	1.2714	1.1994	2.3366	3.0057	9.6687	10.0586
183.	08/349	02/314	3.8573	4.0007	1.3506	1.3000	3.5305	4.0002	10.7089	10.9991
184.	06/327	01/262	10.8583	11.1496	1.2502	1.1963	10.5339	11.0308	5.7110	5.7737
185.	05/008	01/262	7.8025	8.0717	1.3699	1.2982	3.3502	4.0148	12.8971	13.1916
186.	04/013	02/015	8.8314	9.0316	1.3597	1.2993	6.4455	7.0065	7.7562	8.0522
187.	04/025	01/381	4.8501	5.0211	1.3531	1.2995	4.5067	5.0044	7.2942	7.5682
188.	06/335	04/172	7.7714	8.0043	1.2809	1.1999	6.2482	7.0009	5.1338	5.5937
189.	07/166	01/410	6.7652	7.0906	1.2831	1.1978	6.2277	7.0187	7.6212	7.9629
190.	04/323	02/318	7.8573	8.0506	1.2506	1.1988	7.5305	8.0104	6.7089	6.9235
191.	04/324	01/262	2.8842	3.0232	1.3410	1.2995	2.6190	3.0048	9.5638	9.7650
192.	05/387	02/318	6.8635	7.1770	1.2484	1.1956	6.5510	7.0364	6.1216	6.1322
193.	05/350	02/318	5.8345	6.4718	1.3586	1.2882	5.4557	6.0970	8.3625	7.9858
194.	05/324	03/321	7.8842	8.0232	1.3410	1.2995	5.6190	6.0048	5.8688	6.0650
195.	05/310	02/275	7.8521	8.0885	1.1524	1.0978	7.5135	8.0182	7.6984	7.8681
196.	06/301	02/209	4.8894	5.0211	1.1392	1.0995	3.6360	4.0044	8.0743	8.2682
197.	06/321	01/262	2.6556	3.1643	1.1219	0.9959	1.1671	3.0338	3.2976	3.7513
198.	07/379	01/319	7.8066	8.0295	1.2685	1.1993	6.3638	7.0061	9.2056	9.5554
199.	07/350	02/209	5.8449	6.0548	1.3549	1.2987	4.4897	5.0113	9.8836	10.1171
200.	07/325	03/231	5.8718	6.5750	1.3454	1.2855	5.5782	6.1182	8.5385	7.9295
201.	08/303	02/175	1.8397	2.0043	1.1568	1.0999	1.4727	2.0009	13.1731	13.4937
202.	08/343	03/321	3.8914	4.1875	1.3385	1.2953	3.6428	4.0386	9.3785	9.3163
203.	08/330	01/178	7.7114	8.0022	1.3022	1.2000	6.0508	7.0005	7.4115	7.9969
204.	10/328	02/319	7.8201	8.0169	1.2637	1.1996	5.4081	6.0035	8.4330	8.7745
205.	06/308	02/321	9.8562	10.0043	1.2517	1.1999	3.5203	4.0009	11.0026	11.2937
206.	04/331	02/275	5.8676	6.0022	1.2469	1.2000	3.5646	4.0005	8.1300	8.3969
207.	02/345	01/191	5.8914	6.0359	1.2385	1.1991	4.6428	5.0074	6.9785	7.1458
208.	06/312	03/231	8.8459	9.0759	1.2546	1.1981	6.4931	9.0156	7.6857	7.8853
209.	07/303	03/231	3.8397	4.0043	1.1568	1.0999	3.4727	4.0009	11.1731	11.4937
210.	03/262	02/209	7.8573	8.0232	1.2506	1.1995	7.5305	8.0048	6.3089	6.5650
211.	03/264	02/275	5.7859	6.0190	1.3758	1.2996	5.2958	6.0039	8.8634	9.2714
212.	10/230	05/191	5.8666	6.0043	1.3473	1.2999	5.5612	6.0009	10.7279	10.9937
213.	06/218	01/207	4.8625	5.0022	1.1487	1.1000	4.5476	5.0005	7.1195	7.3969
214.	05/210	04/178	8.8614	9.0611	1.2491	1.1985	5.5441	6.0126	6.2174	6.4076
215.	09/205	01/207	6.8645	7.0380	1.4480	1.3991	6.5544	7.0078	7.0237	7.2427
216.	02/276	02/209	6.8666	7.0007	1.1473	1.1000	5.5612	6.0002	7.7279	7.9991
217.	09/204	01/181	8.8666	9.0169	1.3473	1.2996	8.5612	9.0035	8.7279	8.9745
218.	05/220	04/178	5.8821	6.0401	1.2418	1.1990	4.6122	5.0083	10.3596	10.5395
219.	09/209	04/178	4.8935	5.2338	1.2377	1.1942	4.6496	5.0481	12.1828	12.0461
220.	06/229	01/232	3.8873	4.0043	1.2399	1.1999	2.6292	3.0009	9.4701	9.6937
221.	10/189	04/178	5.8583	6.0043	1.2502	1.1999	4.5339	5.0009	10.6110	10.8937
222.	09/160	04/157	5.8790	6.0422	1.8429	1.7990	3.6020	4.0087	12.7532	12.9363
223.	10/160	04/157	8.8687	9.0401	2.0465	1.9990	8.5680	9.0083	8.2321	8.4395
224.	10/149	01/091	5.8521	6.0569	1.9524	1.8986	5.5135	6.0117	10.1984	10.4140
225.	05/145	01/100	3.8470	4.0190	2.0542	1.9996	2.4965	3.0039	6.1878	6.4714
226.	04/179	01/091	6.8656	7.0169	1.3476	1.2996	6.5578	7.0035	7.1258	7.3745
227.	04/188	02/209	4.8232	5.0022	1.0626	1.0000	4.4143	5.0005	6.8393	7.1969
228.	07/178	01/173	5.8718	6.0632	1.3454	1.2985	5.5782	6.0130	12.0385	12.2044
229.	03/174	02/103	5.8449	6.0022	1.5549	1.5000	5.4857	6.0005	9.6636	9.9969
230.	06/078	01/100	9.7583	10.1032	1.8714	1.7974	9.3366	10.0213	10.7887	11.0438
231.	06/080	02/103	4.9090	5.0085	1.5323	1.4998	4.7007	5.0018	10.1144	10.2873
232.	06/081	02/103	9.8325	10.0211	1.2593	1.1995	8.4489	9.0044	7.2583	7.5682
233.	08/093	04/265	7.8645	8.1036	1.8480	1.7973	7.5544	8.0226	9.3237	9.4342
234.	09/130	02/103	8.8449	9.0569	1.5549	1.4986	8.4897	9.0117	7.4836	7.7140
235.	09/267	11/002	9.8439	10.1264	1.4553	1.3969	5.4863	6.0260	9.8815	10.0087
236.	11/181	01/091	8.8118	9.0043	1.2667	1.1999	8.3808	9.0009	5.1161	5.4937
237.	12/181	01/091	7.8739	8.1011	1.3467	1.2975	5.5850	6.0208	8.9127	9.0470
238.	08/180	01/181	6.8656	7.0064	1.3476	1.2999	6.5578	7.0013	9.8258	10.0905
239.	07/218	01/091	8.8945	9.0169	1.1374	1.0996	8.6530	9.0035	8.4149	8.6745
240.	08/158	01/181	5.8149	6.1117	1.3656	1.2972	5.3910	6.0230	9.9224	10.1310
241.	06/175	01/178	3.8459	4.0211	1.3553	1.2995	3.4863	4.0044	10.0815	10.3682
242.	06/205	01/091	9.8490	10.0274	1.9535	1.8994	9.5033	10.0057	6.7921	7.0586
243.	09/321	02/275	7.8832	8.0169	1.2414	1.1996	7.6156	8.0035	7.3617	7.5745
244.	10/057	01/059	6.8666	7.0022	1.3473	1.3000	5.5612	6.0005	7.2279	7.4969
245.	06/047	02/051	6.8511	7.0022	1.3527	1.3000	5.5101	6.0005	6.4963	6.7969
246.	10/047	01/059	5.8480	6.0022	1.5558	1.5000	5.4999	6.0005	11.4899	11.7969
247.	05/047	02/051	10.8501	11.0043	1.2331	1.1999	10.5067	11.0009	10.4942	10.7937
248.	04/012	008620	6.8345	7.1096	1.8586	1.7973	5.4557	6.0226	8.3625	9.1342
249.	02/012	008620	7.8501	8.2970	1.7531	1.6926	5.5067	6.0611	8.1942	8.0504
250.	03/016	02/017	7.8418	8.1538	1.3560	1.2962	7.4795	8.0317	8.2773	8.8673
251.	10/017	03/027	6.8397	7.0843	1.5568	1.4979	6.4727	7.0174	7.4731	7.6725
252.	09/019	008620	6.8552	7.0043	1.7513	1.6999	6.5237	7.0009	8.9047	9.1937
253.	03/020	04/265	7.8676	8.0085	1.4469	1.3998	7.5646	8.0018	9.1300	9.3873
254.	02/004	01/265	8.8645	9.0064	1.1480	1.0999	1.5544	2.0013	10.5237	10.7905
255.	08/005	01/265	4.8635	5.0927	1.4484	1.3977	1.5510	2.0191	7.2216	7.3597

I_1=Age at farrowing I_2=Post weaning conception period I_1=Litter size at birth I_2=Average weight of a piglet at birth I_3=Litter size at weaning I_4=Average weight of a piglet at weaning

Appendix I(b)

Phenotypic index (I=Y-bX) of pigs based on one main character and one auxiliary character in the second parity

Sl. No.	Dam no.	Sire no.	I_1:Y_1 Vs X_1	I_2:Y_1 Vs X_2	I_3:Y_2 Vs X_1	I_4:Y_2 Vs X_2	I_5:Y_3 Vs X_1	I_6:Y_3 Vs X_2	I_7:Y_4 Vs X_1	I_8:Y_4 Vs X_2
1.	04/196	02/036	7.3355	7.1009	1.1924	1.4432	7.3658	7.1283	8.7317	9.0902
2.	07/199	02/036	8.4811	8.7536	1.0598	1.2845	8.5047	8.7611	5.9466	6.0796
3.	08/256	01/054	6.4811	6.9867	1.1598	1.3992	6.5047	6.9871	9.1466	9.2043
4.	03/268	01/184	7.4828	7.9401	1.2606	1.4963	5.5064	5.9419	11.1468	11.2194
5.	04/287	01/184	7.3989	7.6071	1.2217	1.4752	6.4263	6.6191	7.9382	8.1268
6.	04/295	04/051	7.4126	7.9734	1.2281	1.4984	4.4393	4.9742	11.9396	12.0086
7.	06/298	02/036	8.6096	8.9867	1.1193	1.2992	8.6273	8.9871	8.5599	8.6043
8.	06/333	01/280	5.3886	5.9667	1.2170	1.4979	3.4165	3.9678	9.2171	9.3108
9.	05/341	02/036	8.5702	8.9801	1.2010	1.3988	8.5897	8.9807	6.4558	6.5065
10.	03/353	03/031	8.5325	8.7936	1.2836	1.4870	6.5538	6.7999	6.8519	6.9667
11.	06/023	01/054	8.5822	8.9934	1.3066	1.4996	8.6012	8.9936	5.9570	6.0022
12.	08/023	02/141	7.5325	6.9078	1.2866	1.4310	5.5538	4.9410	12.6519	13.0525
13.	04/027	02/036	7.5822	7.8469	1.3066	1.4904	4.6032	4.8515	13.1570	13.2485
14.	04/040	03/392	9.5856	9.9135	1.3082	1.4946	9.6044	9.9161	8.9574	9.0280
15.	08/041	01/054	7.5119	7.9667	1.1741	1.3979	5.5342	5.9678	8.0498	8.1108
16.	04/042	04/051	8.5685	7.7812	1.3002	1.4229	5.5881	4.8183	11.2556	11.6933
17.	06/137	02/036	10.5342	10.9135	1.0844	1.2946	10.5554	10.9161	9.9521	10.0280
18.	08/137	01/138	8.5291	8.1409	1.1820	1.3457	8.5505	8.1670	9.3516	9.6773
19.	05/139	03/031	8.5102	8.9068	1.1733	1.3942	8.5325	8.9096	10.1496	10.2301
20.	06/140	04/371	8.6627	7.9544	1.3438	1.4339	7.6740	6.9862	7.6653	8.0374
21.	04/141	04/371	5.7003	5.9468	1.2613	1.3967	4.7140	4.9484	10.2692	10.3172
22.	05/143	02/137	9.7157	9.7003	1.2684	1.3811	6.7287	6.7095	7.3708	7.4968
23.	06/143	02/137	8.5650	8.8935	1.0986	1.2933	8.5848	8.8967	8.4553	8.5344
24.	04/144	03/392	7.4469	7.9401	1.0439	1.2963	3.4720	3.9419	6.9431	7.0194
25.	05/144	02/036	2.4931	2.9334	1.1653	1.3958	1.5162	1.9355	11.4479	11.5215
26.	09/150	04/371	10.5976	10.8668	1.2137	1.3916	10.6139	10.8709	6.9586	7.0430
27.	06/153	01/138	8.5359	8.7203	1.1852	1.3824	7.5570	7.7288	8.5523	8.6903
28.	09/153	02/137	8.5873	8.9334	1.2089	1.3958	5.6061	5.9355	9.3576	9.4215
29.	04/155	01/138	6.3441	6.9734	0.8963	1.1984	6.3739	6.9742	9.8325	9.9086
30.	05/162	04/371	4.6027	4.9401	1.2161	1.3963	4.6208	4.9419	9.5592	9.6194
31.	05/164	01/140	5.5942	5.9934	1.2121	1.3996	5.6126	5.9936	11.5583	11.6022
32.	07/166	03/392	1.5428	1.5205	1.2883	1.4697	1.5636	1.5351	15.1530	15.3548
33.	08/174	03/392	10.4914	10.9667	1.1645	1.3979	8.5145	8.9678	7.7477	7.8108
34.	07/175	02/036	8.5907	8.7137	1.2105	1.3819	8.6093	8.7224	10.9579	11.0925
35.	07/177	02/137	5.5599	5.8402	1.1963	1.3899	5.5799	5.8451	10.1548	10.2516
36.	08/198	02/036	9.5941	9.9801	1.2121	1.3988	8.6126	8.9807	6.7583	6.8065
37.	06/200	02/143	8.6264	8.8469	1.2280	1.3904	8.6453	8.8515	8.4618	8.5495
38.	07/209	03/392	11.5736	11.8935	1.2026	1.3933	9.5930	9.8967	9.1562	9.2344
39.	05/210	01/140	5.5976	5.9734	1.2137	1.3984	5.6159	5.9742	10.0586	10.1086
40.	09/211	01/054	6.5633	6.9334	1.0978	1.2958	2.5832	2.9355	8.3551	8.4215
41.	04/212	04/371	7.6061	7.0476	1.1177	1.2398	6.6241	6.0766	9.8595	10.2074
42.	10/233	04/371	8.6079	8.8935	1.2185	1.3933	7.6257	7.8967	9.8597	9.9344
43.	09/237	01/138	9.5941	9.3940	1.2121	1.3617	9.6126	9.4124	8.2583	8.4956
44.	06/252	03/392	5.5000	5.8868	1.2685	1.4929	3.5227	3.8903	11.0486	11.1366
45.	07/271	01/138	7.6010	7.9601	1.2153	1.3975	3.6192	3.9613	9.6590	9.7129
46.	08/280	01/138	8.6250	8.9001	1.2264	1.3937	7.6420	7.9032	9.9615	10.0323
47.	07/287	02/137	6.5976	6.9601	1.1137	1.2975	5.6159	5.9613	7.0586	7.1129
48.	06/288	01/138	4.5890	4.8202	1.1097	1.2887	3.6077	3.8257	9.5578	9.6581
49.	04/291	03/392	4.5238	4.9734	1.1796	1.3986	4.5456	4.9742	8.3511	8.4086
50.	06/294	03/392	8.5548	8.9867	1.0939	1.2992	7.5750	7.9871	7.3542	7.4043
51.	07/295	04/371	10.5685	10.9867	1.2002	1.3992	6.5881	6.9871	8.1556	8.2043
52.	07/306	04/371	5.5719	5.9867	1.1018	1.2992	5.5914	5.9871	9.5560	9.6043
53.	08/310	03/392	9.5770	9.8802	1.2042	1.3925	7.5963	7.8838	8.4565	8.5387
54.	07/319	01/184	8.5719	8.9334	1.1018	1.2958	8.5914	8.9355	7.3560	7.4215
55.	03/335	01/138	7.6267	7.9401	1.1272	1.2963	4.6437	4.9419	10.9616	11.0194
56.	08/360	01/138	4.6558	4.9068	1.2407	1.3942	4.6715	4.9096	10.8646	10.9301
57.	10/367	03/011	9.6387	9.9201	1.1327	1.2950	8.6551	8.9226	5.9629	6.0258
58.	09/371	04/371	6.6558	6.8868	1.2407	1.3929	6.6715	6.8903	9.1646	9.2366
59.	06/187	04/051	8.4058	8.9401	1.1249	1.3963	8.4328	8.9419	7.3389	7.4194
60.	07/188	04/172	5.5034	5.9934	1.1701	1.3996	5.5260	5.9936	9.4489	9.5022
61.	01/191	01/037	8.4674	8.8935	1.0534	1.2933	6.4916	6.8967	9.3452	9.4344
62.	06/331	03/179	7.6353	7.9401	1.2312	1.3963	7.6519	7.9419	8.8625	8.9194
63.	06/253	04/172	8.5513	8.9667	0.8923	1.0979	8.5717	8.9678	8.6539	8.7108
64.	06/256	01/182	6.5496	6.9981	1.1915	1.3999	6.5701	6.9981	9.8537	9.9007
65.	07/177	01/037	5.4537	5.9334	1.0471	1.2958	5.4786	5.9355	10.7438	10.8215
66.	07/009	04/051	9.5256	9.9801	0.7804	0.9968	9.5472	9.9807	10.4512	10.5065
67.	03/374	01/410	2.4451	2.9268	0.8431	1.0954	2.4704	2.9290	9.2419	9.3237
68.	04/201	01/084	6.4982	6.8402	1.0677	1.2899	6.5211	6.8451	12.9484	13.0516
69.	06/047	01/410	5.5085	5.9401	1.2725	1.4963	5.5309	5.9419	8.9495	9.0194
70.	07/287	02,038	10.4743	10.8802	1.1566	1.3925	9.4982	9.8838	7.8459	7.9387
71.	07/189	04/051	4.4811	4.6471	1.1598	1.3777	4.5047	4.6578	10.5466	10.7139
72.	03/191	02/038	3.4606	3.9534	1.1503	1.3971	3.4851	3.9548	13.8445	13.9151
73.	07/082	04/172	6.6421	6.9534	0.8343	0.9971	6.6584	6.9548	10.0632	10.1151
74.	08/072	01/037	9.4743	9.9667	0.7566	0.9979	7.4982	7.9678	9.9459	10.0108
75.	06/090	03/088	2.5942	2.9801	0.8121	0.9988	2.6126	2.9807	10.2583	10.3065
76.	06/084	03/088	7.5856	7.9581	0.9082	1.0999	6.6044	6.9981	9.4574	9.5007
77.	07/294	02/036	2.5291	2.9401	1.2820	1.4975	2.5505	2.9613	10.4516	10.5129
78.	07/180	02/036	5.4212	5.7403	1.0320	1.2836	5.4475	5.7482	10.2405	10.3839
79.	02/248	01/053	8.5616	8.9734	1.0971	1.2984	8.5816	8.9742	10.1549	10.2086
80.	06/255	03/265	9.5036	9.9534	1.1701	1.3971	8.5260	8.9548	6.7489	6.8151
81.	04/271	02/036	9.5256	9.9867	1.0804	1.2992	9.5472	9.9871	7.2512	7.3043
82.	03/272	02/036	6.5222	6.9801	1.2788	1.4988	6.5440	6.9807	7.2509	7.3065
83.	08/098	03/246	4.6901	4.9667	1.1565	1.2979	3.7042	3.9678	12.4681	12.5108
84.	09/082	01/182	6.6233	6.6404	0.8256	0.9773	6.6404	6.6513	9.8613	10.0161
85.	07/340	01/182	5.5325	5.9601	0.8836	1.0975	5.5538	5.9613	8.4519	8.5129
86.	06/371	02/160	1.5976	1.9867	0.9137	1.0992	1.6159	1.9871	8.6586	8.7043
87.	05/015	01/319	4.6130	4.9867	1.2208	1.3992	4.6306	4.9871	9.0602	9.1043
88.	08/375	04/172	3.4537	3.9201	0.8471	1.0950	2.4786	2.9226	12.9438	13.0258
89.	08/067	03/088	7.6096	7.9734	1.1193	1.2984	3.6273	3.9742	10.2599	10.3086
90.	07/028	01/262	7.6421	7.6337	1.0343	1.1769	7.6584	7.6449	6.9632	7.1182

Appendix 1(b) continues

Sl. No.	Dam no.	Sire no.	I_1:Y_1 Vs X_1	I_2:Y_1 Vs X_2	I_3:Y_2 Vs X_1	I_4:Y_2 Vs X_2	I_5:Y_3 Vs X_1	I_6:Y_3 Vs X_2	I_7:Y_4 Vs X_1	I_8:Y_4 Vs X_2
91.	03/331	03/392	9.4811	9.9268	1.2598	1.4954	9.5047	9.9290	6.4466	6.5237
92.	06/185	02/031	6.5633	6.9934	0.8978	1.0996	4.5832	4.9936	11.3551	11.4022
93.	07/160	01/182	8.6678	8.9667	0.8462	0.9979	7.6829	7.9678	12.0659	12.1108
94.	08/166	03/246	1.6335	1.9867	0.9304	1.0992	1.6502	1.9871	18.9623	19.0043
95.	06/146	04/371	6.5496	6.9981	1.1915	1.3999	6.5701	6.9981	9.8537	9.9007
96.	04/013	01/381	7.5993	7.7669	1.1145	1.2653	5.6175	5.7740	6.9588	7.0753
97.	04/324	02/231	4.6918	4.6138	1.1573	1.2756	4.7058	4.6255	10.0683	10.2267
98.	05/387	02/321	6.5308	6.4539	0.9828	1.1655	6.5521	6.4705	8.1518	8.3763
99.	05/324	03/231	1.6918	1.9734	1.2573	1.3984	1.7058	1.9742	12.4685	12.5086
100.	05/310	01/262	6.5942	6.6271	1.1121	1.2765	6.6126	6.6304	8.4583	8.6204
101.	06/301	03/313	3.7106	3.9001	1.1660	1.2937	3.7238	3.9032	10.8703	10.9323
102.	06/321	03/313	9.5753	8.9344	1.0034	1.1326	2.5946	6.9668	7.0563	7.4439
103.	07/342	02/209	6.7192	6.5205	1.0700	1.1697	6.7320	6.5351	7.9711	8.1548
104.	08/330	05/083	6.4177	6.6138	1.0304	1.2756	6.4442	6.6255	8.4401	8.6247
105.	10/334	01/262	9.6472	9.6804	0.9367	1.0798	8.6693	8.6901	7.9637	8.1032
106.	10/328	01/262	6.4246	6.9801	1.0336	1.2988	6.4508	6.9807	11.7408	11.8065
107.	05/242	01/191	7.8665	7.9401	1.1382	1.1963	7.8725	7.9419	6.8863	8.9194
108.	08/334	02/275	4.7603	4.9534	1.1890	1.2971	4.7712	4.9548	11.3754	11.4151
109.	04/331	05/191	4.6832	4.4672	1.0534	1.1663	4.6976	4.4834	7.9674	8.1720
110.	02/345	04/321	6.6935	6.9867	1.0581	1.1992	6.7074	6.9871	11.9685	12.0043
111.	07/285	02/314	9.6558	9.7603	1.0407	1.1849	9.6715	9.7676	7.9646	8.0774
112.	07/254	03/321	5.6798	5.9801	1.0518	1.1988	2.6944	2.9807	10.2671	10.3065
113.	04/215	01/191	3.7277	3.4539	1.0740	1.1655	3.7401	3.4705	8.9720	9.1763
114.	03/262	03/313	3.6438	3.9468	1.1351	1.2967	3.6600	3.9484	10.8634	10.9172
115.	09/209	01/178	6.5445	6.9667	1.0891	1.2979	6.5652	6.9678	8.6532	8.7108
116.	09/255	02/314	5.6318	5.7070	1.1296	1.2815	5.6486	5.7159	9.5622	9.6946
117.	10/160	04/157	8.6541	8.9268	1.1399	1.2954	8.6698	8.9290	8.9644	9.0237
118.	06/179	02/209	4.6644	4.9468	1.0446	1.1967	4.6796	4.9486	8.4655	8.5172
119.	03/174	01/091	4.6472	4.9867	1.0367	1.1992	4.6633	4.9871	8.1637	8.2043
120.	05/183	01/091	9.7089	9.9601	1.0652	1.1975	4.7221	4.9613	10.9701	11.0129
121.	06/080	01/091	7.7449	7.4739	1.0819	1.1668	7.7565	7.4899	9.0738	9.2690
122.	08/180	01/091	9.6764	9.9867	0.9502	1.0992	8.6911	8.9871	6.5667	6.6043
123.	07/167	01/178	4.7038	4.8802	1.0629	1.1925	4.7172	4.8838	11.5696	11.6387
124.	05/231	01/191	2.5411	2.9867	1.0875	1.2992	2.5619	2.9871	14.9528	15.0043
125.	03/004	08/265	7.6866	7.9867	1.0549	1.1992	6.7009	6.9871	6.7678	6.8043
126.	02/004	08/002	10.6764	10.9934	1.0502	1.1996	6.6911	6.9936	6.8667	6.9022

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix I(c)

Phenotypic index (I=Y-bX) of pigs based on one main character and one auxiliary character in the third parity

Sl. No.	Dam no.	Sire no.	I_1:Y_1 Vs X_1	I_2:Y_1 Vs X_2	I_3:Y_2 Vs X_1	I_4:Y_2 Vs X_2	I_5:Y_3 Vs X_1	I_6:Y_3 Vs X_2	I_7:Y_4 Vs X_1	I_8:Y_4 Vs X_2
1.	07/253	01/184	4.2622	6.7387	1.0669	1.5005	3.5378	5.8728	10.0477	8.4045
2.	07/188	01/184	6.1475	8.7968	1.5487	2.0004	5.4346	7.9011	10.4294	8.6368
3.	03/331	03/392	7.2704	9.8403	1.0682	1.5003	7.5452	9.9223	8.4419	6.6861
4.	07/160	01/182	4.9016	6.9710	0.6681	1.0001	5.1128	6.9859	11.3929	9.9339
5.	06/084	01/037	5.5491	7.9129	0.6123	1.0002	5.7958	7.9576	11.0436	9.4015
6.	07/180	02/038	2.7376	5.9855	0.9839	1.5001	2.0660	4.9930	13.9209	11.6170
7.	05/184	01/280	4.7376	7.9420	0.8839	1.4001	4.0660	6.9718	11.7209	9.4677
8.	02/248	04/371	5.4098	7.9176	0.9902	1.4012	5.6705	7.6677	11.6428	10.5949
9.	06/153	01/138	4.2622	6.7387	1.0669	1.5005	3.5378	5.8728	10.0477	8.4045
10.	06/255	01/184	5.1065	7.9420	1.0423	1.5001	3.3977	5.9718	8.5585	6.5677
11.	05/256	01/184	-1.7788	0.7097	1.1604	1.6005	-1.4991	0.8586	15.9769	14.3383
12.	04/271	01/054	3.2458	5.8549	1.0643	1.5003	3.5230	5.9293	12.9594	11.1692
13.	03/272	01/037	8.2294	10.7677	0.9617	1.4004	6.5083	8.8869	9.9711	8.2706
14.	01/166	04/172	5.8852	7.8595	0.6655	1.0013	5.0981	6.6395	11.8045	11.1626
15.	08/098	03/246	5.0163	6.9565	0.6862	1.0001	5.2160	6.9788	13.8112	12.4508
16.	03/191	02/038	4.9671	7.7968	0.9202	1.4004	2.2724	4.9011	8.9577	7.0368
17.	07/082	01/037	5.7704	7.8549	0.6473	1.0003	5.9949	7.9293	13.9862	12.5692
18.	08/072	02/038	6.9917	9.9855	0.6241	1.1001	5.2945	7.9930	9.3402	7.2170
19.	06/185	01/037	6.5409	7.9692	0.9110	1.3018	4.7884	6.4980	12.1495	11.6008
20.	09/371	01/140	4.9016	6.9710	0.6681	1.0001	5.1128	6.9859	11.3929	9.9339
21.	06/256	02/038	5.3934	7.9565	1.0877	1.5001	5.6557	7.9788	8.4544	6.6508
22.	04/196	01/184	4.2458	7.9855	0.9061	1.5001	2.6237	5.9930	13.2708	10.6170
23.	07/199	02/038	6.7786	8.3158	0.9904	1.5029	7.1028	9.1799	9.1918	8.8619
24.	08/256	03/392	10.0409	11.8094	0.9319	1.4020	6.3387	8.4203	7.3052	6.5168
25.	03/268	02/036	4.9999	7.9565	1.0256	1.5001	5.3019	7.9788	11.2343	9.1508
26.	04/287	03/392	4.1966	7.1757	0.7983	1.4011	4.5794	7.6960	10.1058	8.1273
27.	04/295	01/280	1.6966	4.9565	0.9774	1.5001	1.0291	3.9788	9.4501	7.1508
28.	06/298	03/392	6.6639	8.8258	1.0304	1.4003	4.8990	6.9152	9.8620	8.4030
29.	06/333	01/054	6.5737	9.5209	0.7580	1.3008	5.9185	8.7667	12.1376	10.2581
30.	05/341	02/036	6.4671	7.3593	1.0993	1.5028	6.7221	8.2011	9.0019	9.1111
31.	03/353	01/054	4.0491	6.9129	0.9332	1.4002	3.3461	5.9576	10.9993	9.0015
32.	06/023	01/054	0.5327	2.8403	1.1097	1.5003	0.7811	2.9223	12.0553	10.4861
33.	06/023	02/036	7.9425	9.9692	0.8163	1.3018	7.2503	9.4980	9.7752	8.8008
34.	04/040	02/137	0.6639	1.6352	1.1304	1.5023	-0.1010	1.3354	13.3620	13.2898
35.	08/041	02/036	2.1884	4.9855	0.9552	1.4001	2.4714	4.9930	13.7002	11.7170
36.	06/137	02/036	4.2294	6.5209	0.9617	1.4008	2.5083	4.7667	10.5711	9.1582
37.	08/137	02/036	8.2130	10.4919	0.8591	1.3009	6.4936	8.7526	12.9827	11.5920
38.	04/141	01/138	2.0327	3.3902	1.1888	1.5011	1.2308	2.7031	9.3996	8.7104
39.	05/143	01/184	5.0573	6.9420	0.9927	1.3001	5.2529	6.9718	9.5821	8.2677
40.	06/143	03/031	7.3360	9.8839	0.8786	1.3002	7.6041	9.9435	9.2953	7.5353
41.	09/150	04/371	7.4507	9.7532	0.8967	1.3005	5.7073	7.8739	10.4136	8.8876
42.	09/153	02/137	5.4917	7.8549	1.0032	1.4003	2.7442	4.9293	15.5145	13.9692
43.	05/162	03/392	2.5737	4.5790	1.0162	1.4008	2.8179	4.7950	12.9261	11.6905
44.	05/164	01/140	5.5737	7.5790	1.0162	1.4008	1.8179	3.7950	14.5261	13.2905
45.	08/174	03/392	6.0737	8.8258	0.7371	1.2003	6.3682	8.9152	10.0819	8.2030
46.	07/175	04/371	8.2704	10.9420	0.9682	1.4001	6.5452	8.9718	10.6419	8.7677
47.	07/177	02/137	5.2540	7.8691	0.9656	1.4003	5.5304	7.9364	9.1536	7.3523
48.	08/198	02/036	7.5737	9.9710	0.9162	1.3001	7.8179	9.9859	11.0261	9.3339
49.	06/200	06/018	3.5819	5.9565	0.9175	1.3001	3.8253	5.9788	11.9203	10.2508
50.	07/209	03/392	4.3688	6.8984	0.8838	1.3002	4.6336	6.9506	9.6719	7.9184
51.	05/210	01/138	2.5901	4.8258	1.0188	1.4003	2.8327	4.9157	11.1145	9.6030
52.	04/212	03/006	7.4815	9.4338	1.0019	1.4010	3.7368	5.7243	10.6903	9.5596
53.	10/233	02/036	4.5327	6.8403	0.8097	1.2003	1.7811	3.9223	11.2553	9.6861
54.	07/271	01/140	5.5655	7.7387	0.9149	1.3005	4.8106	6.8728	11.6320	10.2045
55.	05/308	01/318	3.1557	4.9565	1.2083	1.5001	3.3413	4.9788	13.3121	12.0508
56.	04/323	01/317	5.8442	7.9420	0.8590	1.2001	5.0612	6.9718	10.5337	9.0617
57.	05/324	01/319	6.0655	7.4483	0.8940	1.2010	6.2602	7.7314	9.3763	8.6427
58.	06/301	01/318	1.2294	3.9855	1.0617	1.5001	1.5083	3.9930	14.8711	12.9170
59.	06/321	01/326	4.0738	5.5916	1.0535	1.2024	1.1670	1.3142	9.1590	10.1405
60.	08/303	01/317	6.8032	8.7623	0.8525	1.2004	7.0243	8.8940	6.7623	5.4537
61.	08/343	01/262	7.4671	9.5499	0.7993	1.2008	5.7221	7.7809	9.8019	8.5243
62.	10/328	01/322	2.5737	4.4483	0.8162	1.2010	2.8179	4.7314	9.7261	8.6427
63.	07/254	02/314	6.0163	7.9710	0.8862	1.2001	6.2160	7.9859	10.7112	9.3339
64.	04/215	02/314	4.5573	6.8113	0.8136	1.2004	4.8032	6.9081	9.7374	8.2199
65.	09/218	01/191	1.7950	3.9710	0.8512	1.2001	2.0170	3.9859	12.1687	10.6339
66.	09/209	02/231	-0.6640	1.7242	0.9786	1.4005	-0.3959	1.8657	14.8953	13.3214
67.	09/255	01/317	6.4180	7.1561	0.7915	1.2031	3.6779	5.1021	8.9369	9.2479
68.	07/261	01/262	6.0000	5.8839	0.9836	1.3002	4.2013	5.9435	11.7229	10.4353
69.	07/218	02/209	10.0245	10.8820	0.7875	1.1019	10.2234	11.4556	9.2054	9.1023
70.	11/265	08/002	7.7376	9.9420	1.1421	1.5001	5.9654	5.9718	12.2095	10.6677
71.	09/126	03/159	6.7131	8.9710	0.9382	1.3001	1.9433	3.9859	14.6270	13.0339

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix I(d)

Phenotypic index (I=Y-bX) of pigs based on one main character and one auxiliary character in the fourth parity

Sl. No.	Dam no.	Sire no.	I_1:Y_1 Vs X_1	I_2:Y_1 Vs X_2	I_3:Y_2 Vs X_1	I_4:Y_2 Vs X_2	I_5:Y_3 Vs X_1	I_6:Y_3 Vs X_2	I_7:Y_4 Vs X_1	I_8:Y_4 Vs X_2
1.	04/196	01/054	1.4787	3.9475	1.1933	1.4987	-0.8731	3.9623	11.1711	9.5608
2.	08/256	01/184	10.5762	8.9811	1.1052	1.2986	4.3154	6.1130	6.8064	9.8462
3.	03/268	02/137	5.9322	7.6060	1.2485	1.4901	2.0035	5.7170	9.0705	8.1356
4.	04/287	01/184	6.2495	8.5010	0.9654	1.2875	3.6839	8.6415	8.8230	7.5770
5.	04/295	02/036	3.7469	5.8950	1.2259	1.4974	1.6453	5.9246	15.7933	14.4215
6.	06/298	03/392	8.2834	9.6323	1.1912	1.3908	1.6822	4.7359	7.3378	6.6252
7.	06/333	03/392	6.5323	7.6361	1.0998	1.3656	4.2306	8.0188	9.7355	8.6791
8.	05/341	01/280	6.2102	4.6115	1.2823	1.4145	6.5408	5.5659	7.2862	10.0174
9.	03/353	04/051	5.9469	7.7374	1.1502	1.3934	3.0318	6.8114	12.1608	11.1037
10.	06/023	02/036	4.2151	5.0544	1.2829	1.4762	2.5502	5.3208	13.0830	12.9933
11.	04/040	02/143	3.8932	5.7111	1.1437	1.3928	-0.0719	3.7925	15.0963	14.0341
12.	04/141	01/138	4.3565	5.9475	1.2001	1.3987	2.8235	5.9623	10.5193	9.5608
13.	05/143	03/392	3.3663	4.7374	1.1013	1.2934	-0.1576	2.8114	12.0828	11.3037
14.	06/143	01/038	7.1078	8.9475	0.8688	1.0987	3.3428	6.9623	9.5541	8.3608
15.	05/162	06/018	6.1468	7.9738	0.9746	1.1994	4.4182	7.9812	10.3283	9.1304
16.	06/200	06/018	6.2785	7.9475	1.0906	1.2987	4.6727	7.9623	7.7410	6.6608
17.	05/184	03/312	0.1175	1.9212	1.2710	1.4981	-1.6383	1.9434	16.7476	15.5912
18.	08/072	04/017	8.9225	10.8950	1.1473	1.3974	5.9846	9.9246	7.1769	5.9215
19.	07/160	01/037	5.4687	6.9212	1.1137	1.2981	1.0403	3.9434	11.0149	10.0912
20.	05/308	02/314	7.6101	8.9212	1.0309	1.1981	5.3137	7.9434	10.3212	9.4912
21.	04/324	01/381	6.3516	7.8950	1.0995	1.2974	2.8141	5.9246	14.3925	13.4215
22.	05/324	01/262	8.3858	9.7374	1.0036	1.1934	1.8801	4.8114	8.0699	7.3037
23.	10/328	03/088	6.1029	7.9212	1.0692	1.2981	2.3334	5.9434	9.2573	8.0912
24.	02/345	01/262	3.5467	4.7111	1.1232	1.2928	2.1912	4.7925	7.6632	7.0341
25.	09/355	01/410	8.1468	7.4258	1.0746	1.2351	3.4182	5.1509	7.7283	9.4760

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix I(e)

Phenotypic index (I=Y-bX) of pigs based on one main character and one auxiliary character in the fifth parity

Sl. No.	Dam no.	Sire no.	I_1:Y_1 Vs X_1	I_2:Y_1 Vs X_2	I_3:Y_2 Vs X_1	I_4:Y_2 Vs X_2	I_5:Y_3 Vs X_1	I_6:Y_3 Vs X_2	I_7:Y_4 Vs X_1	I_8:Y_4 Vs X_2
1.	08/256	02/036	4.1684	8.9787	1.5287	1.2803	5.2269	7.0409	10.6824	8.3053
2.	03/268	02/143	3.8295	7.9970	1.5974	1.3972	6.4695	8.0059	12.3564	10.3008
3.	04/295	02/036	2.5668	6.9970	1.6099	1.3972	4.3731	6.0059	10.0859	7.9008
4.	06/298	02/143	6.4399	9.8717	1.5686	1.2813	6.6935	8.2451	8.8554	7.1313
5.	06/023	03/392	6.0923	9.5817	1.3850	1.1831	5.5660	7.0351	11.8268	9.9045
6.	08/072	01/037	6.8889	10.9756	1.5946	1.3776	9.4913	11.0467	8.2271	6.2069
7.	07/160	02/038	2.8383	5.8962	1.6497	1.4039	4.8397	6.1994	12.0590	10.5253
8.	05/324	01/144	3.6179	6.9939	1.4601	1.2944	5.7588	7.0117	9.3677	7.7015

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix 2(a)

Phenotypic index ($I=Y-b_1X_1-b_2X_2$) of pigs based on one main character and two auxiliary characters in the first parity

Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ X_1&X_2	$I_{2,12}:Y_2$ X_1&X_2	$I_{3,12}:Y_3$ X_1&X_2	$I_{4,12}:Y_4$ X_1&X_2
1.	04/196	04/051	9.6759	1.4226	8.8602	9.7540
2.	07/199	04/172	4.7627	1.2929	3.1362	14.7201
3.	08/256	01/182	7.9796	1.0608	6.4306	6.7795
4.	03/268	04/172	6.9448	1.0642	6.3996	13.3048
5.	04/287	01/182	2.0420	1.2638	1.4003	16.7354
6.	04/295	01/037	8.7929	1.5948	5.1177	7.1459
7.	06/298	01/182	7.8523	1.1600	7.4419	9.5155
8.	06/333	02/038	7.9575	1.3761	6.2874	8.6534
9.	05/341	03/265	3.8172	1.4700	3.3490	10.1700
10.	03/353	02/036	8.8810	1.4668	6.3776	7.9912
11.	06/023	04/371	8.8456	1.4646	6.3986	8.5774
12.	08/023	01/184	9.9176	1.4612	8.4283	7.4855
13.	04/027	04/371	7.8752	1.4610	5.4321	8.0642
14.	04/040	02/036	7.8567	1.5627	7.4165	7.4785
15.	08/041	03/031	7.7956	1.5808	6.2483	9.5917
16.	04/042	02/036	8.0392	1.5670	5.3706	8.7061
17.	04/115	03/392	5.7849	1.4230	4.8532	7.3902
18.	06/137	02/143	7.9559	1.5709	5.3361	10.5122
19.	08/137	02/037	5.8178	1.5756	4.2970	9.0090
20.	05/139	04/371	8.9392	1.5598	6.4412	8.9625
21.	06/140	04/371	6.8872	1.5479	3.5543	8.1839
22.	04/141	03/031	1.8954	1.5471	0.5620	11.6784
23.	05/143	02/036	4.9031	1.5514	3.5207	12.1174
24.	06/143	02/137	4.8756	1.5631	4.4126	9.0413
25.	04/144	02/143	11.0186	1.5580	2.4556	10.7601
26.	05/144	03/392	7.7693	1.3869	7.1925	7.0734
27.	08/146	02/137	7.7710	1.5021	6.0495	7.0057
28.	09/150	03/392	7.8392	1.5634	6.4108	7.1025
29.	06/153	01/138	6.0552	1.5712	5.3305	8.0319
30.	09/153	01/138	11.8547	1.4627	10.4162	7.5827
31.	04/155	01/184	8.0408	1.4715	6.3285	9.0549
32.	05/162	01/184	7.8392	1.5627	5.4173	6.6102
33.	05/164	01/140	6.8495	1.5625	5.4187	10.8938
34.	07/166	04/371	6.8053	1.5751	5.3018	9.7363
35.	07/171	02/143	1.9052	1.5708	0.3387	8.4040
36.	08/174	02/036	4.9336	1.4655	4.3883	13.0114
37.	07/175	02/036	7.8311	1.5649	5.3966	8.8004
38.	07/177	03/392	5.8733	1.5631	5.4123	8.5446
39.	08/198	03/392	8.8485	1.5629	6.4153	6.2916
40.	06/200	02/137	4.8409	1.4599	4.4436	8.1374
41.	03/208	04/371	4.8824	1.5706	3.3420	11.2477
42.	07/209	04/051	8.9069	1.4580	8.4594	8.0401
43.	05/210	01/140	8.8433	1.4626	7.4178	8.0036
44.	09/211	02/143	8.8095	1.4757	3.2959	6.6221
45.	04/212	04/371	7.8574	1.5596	7.4459	6.0111
46.	10/233	04/371	8.8656	1.5580	5.4601	7.4133
47.	09/237	02/137	5.8444	1.5629	5.4167	8.1981
48.	08/250	01/138	5.8612	1.5661	3.3846	11.5338
49.	06/252	03/392	4.8406	1.4765	4.2872	14.6577
50.	07/271	02/137	5.8535	1.7610	5.4323	10.1024
51.	04/273	02/036	6.7862	1.4900	6.1623	10.1090
52.	08/280	01/138	7.0907	1.3546	5.4853	9.1482
53.	07/287	03/392	7.8261	1.4667	7.3796	6.9895
54.	06/288	04/051	7.8251	1.4664	3.3827	10.4950
55.	04/291	03/031	4.8240	1.4755	4.2979	9.1992
56.	06/294	04/371	5.8000	1.4742	4.3108	12.1560
57.	07/295	01/138	10.8131	1.3708	10.3420	5.7689
58.	07/298	03/392	2.9344	1.4637	2.4047	10.1288
59.	07/306	02/137	5.8314	1.5677	2.3706	9.0699
60.	08/310	02/143	6.8385	1.5658	4.3879	5.5775
61.	05/313	01/138	5.8642	1.5643	5.4013	13.5479
62.	06/313	04/371	5.8610	1.5668	4.3776	6.6912
63.	08/318	03/392	5.8972	1.4637	5.4059	5.8955
64.	07/319	01/138	4.8580	1.5666	3.4004	8.0578
65.	07/321	02/143	7.8872	1.4573	7.4664	5.7826
66.	03/335	02/143	7.9572	1.4568	7.4719	8.3416
67.	11/340	02/143	9.8877	1.4621	9.6209	6.8293
68.	10/367	02/143	7.8519	1.4559	5.4809	4.9613
69.	07/375	02/036	10.8534	1.2603	3.4388	8.5101
70.	07/376	01/138	3.8433	1.4720	3.3299	11.1013
71.	07/380	01/184	7.8036	1.3779	4.2755	7.1091
72.	06/390	03/011	9.8151	1.4694	5.3553	8.4809
73.	07/023	01/140	9.8610	1.3540	5.4985	5.3655
74.	08/029	01/040	4.8631	1.3612	2.4309	6.6188
75.	08/034	02/143	8.8520	1.3666	8.3800	6.5447
76.	07/038	03/006	8.8519	1.3659	7.3865	7.8524
77.	06/040	01/003	4.8538	1.4645	4.3998	8.3643
78.	04/044	03/392	8.8427	1.2671	6.3754	7.2557
79.	09/046	02/143	7.8383	1.4644	6.4009	7.7927
80.	06/067	02/143	7.8380	1.4617	7.4269	8.1232
81.	06/069	02/143	2.9180	1.4453	2.5782	12.3576
82.	06/070	02/143	7.8985	1.4567	7.4712	5.1684
83.	05/071	02/143	4.8519	1.4559	4.4809	10.2612
84.	05/073	02/143	4.8933	1.4464	1.5682	10.6893
85.	07/082	01/140	8.9022	1.4525	7.5108	6.0076
86.	04/087	03/011	7.8868	1.4538	4.4989	9.6207
87.	06/104	01/003	6.8947	1.3502	3.5326	9.9457
88.	07/253	02/038	6.9104	1.0617	5.4241	7.9932
89.	04/258	04/172	7.8880	1.1649	7.3949	8.8988
90.	02/248	02/038	4.9585	1.0664	4.3788	11.1568
91.	03/183	01/056	8.8313	1.0670	7.3771	12.6775
92.	05/168	01/182	8.9547	1.2404	5.6224	9.1443
93.	06/187	04/172	6.8970	1.0817	6.2366	10.3006
94.	07/188	01/037	5.7794	1.0839	5.2200	9.2875
95.	02/191	01/182	5.8564	1.0787	5.2667	9.6064
96.	02/043	02/036	7.8242	1.5682	7.3663	7.3776
97.	06/283	01/184	9.7596	1.5020	5.0511	5.3276
98.	06/287	01/054	7.8824	1.2706	7.3420	10.0477
99.	04/292	04/172	9.8121	1.1742	7.3386	9.3668
100.	06/331	01/037	7.8253	1.2685	5.3632	9.7721
101.	06/253	03/051	7.8307	1.1708	5.3412	10.7373
102.	06/256	02/038	2.7689	1.2921	2.1436	16.1179
103.	07/009	01/182	4.8280	1.1740	4.3115	11.9079
104.	06/034	04/172	3.8705	1.1555	3.4836	8.1317
105.	03/374	01/182	6.7842	1.2908	6.1555	11.3047
106.	04/201	03/179	7.8559	1.0745	7.3057	11.2522
107.	06/047	01/326	6.0057	1.3534	4.4994	9.0131
108.	07/373	02/160	2.7873	1.2803	1.2536	9.3125
109.	06/340	04/172	5.9022	1.3719	5.3285	9.7974
110.	05/005	01/037	7.8879	1.4635	7.4079	8.5140
111.	10/351	02/036	3.9021	1.4705	3.3415	11.5127
112.	05/284	01/184	5.7718	1.6097	4.9779	6.4219
113.	04/358	02/036	4.8569	1.2540	4.4979	7.4721
114.	07/284	01/054	5.9686	1.3735	5.3118	10.6620
115.	07/287	01/054	5.7553	1.3913	5.1514	9.7506
116.	07/189	01/037	3.7975	1.1895	2.1672	13.3948
117.	03/191	01/037	1.7585	1.2923	1.1421	12.4343
118.	07/082	01/410	2.9191	1.1456	2.5751	7.8521
119.	08/072	01/037	6.7665	1.0893	5.1693	8.6516
120.	08/085	03/088	4.8058	1.1799	4.2563	11.6830
121.	02/091	03/088	5.7873	1.1803	5.2536	10.6125
122.	06/105	03/088	7.0432	1.2454	6.5731	12.7325
123.	05/115	04/172	3.8669	1.4504	2.4375	8.5849
124.	06/090	03/088	5.8750	1.2589	5.4516	9.7871
125.	05/082	03/088	7.0717	1.1414	6.6096	4.6247
126.	07/117	01/182	2.8430	1.3598	2.4439	17.3361
127.	06/084	01/037	6.8690	1.2611	6.4312	9.7740
128.	06/202	01/182	6.7817	1.0804	6.2529	8.6213
129.	03/005	01/184	5.8271	1.5664	5.3830	8.8917
130.	07/294	02/036	7.7604	1.3902	7.1619	7.5538
131.	05/023	04/371	9.9034	1.4535	9.5012	7.5945
132.	06/338	02/038	7.8096	1.3764	7.2894	10.4145
133.	07/180	02/036	2.7214	1.3030	2.0425	15.0844
134.	05/328	01/179	7.6034	1.5701	6.4169	8.6701
135.	05/184	04/172	5.9055	1.0736	5.3127	11.2735

Appendix 2(a) continues

Sl. No.	Dam no.	Sire no.	$I_{1,12}:I_1$ vs I_1&I_2	$I_{2,12}:I_2$ vs I_1&I_2	$I_{3,12}:I_3$ vs I_1&I_2	$I_{4,12}:I_4$ vs I_1&I_2
136.	02/248	02/038	4.8326	1.0687	4.3610	11.3568
137.	07/253	02/038	6.9104	1.0617	5.4241	7.9932
138.	06/255	02/036	9.8528	1.1742	8.3085	6.8609
139.	05/256	03/051	7.8257	1.1720	7.3307	9.4340
140.	04/271	04/172	7.8413	1.1727	7.3231	7.1980
141.	03/272	02/038	6.8097	1.2771	6.2829	10.2069
142.	08/166	01/410	6.9489	1.3440	6.5891	9.4160
143.	06/196	03/246	3.8121	1.1705	3.3451	10.0744
144.	08/098	05/160	2.9511	1.2360	2.6643	5.6987
145.	09/082	03/246	4.8970	1.1523	4.5134	12.8196
146.	05/085	02/160	2.1417	1.1387	1.6326	10.8285
147.	08/382	03/169	1.9507	1.9606	1.6330	15.9331
148.	07/340	05/249	0.7973	1.8773	0.2811	17.0266
149.	06/371	05/083	4.8739	1.2586	4.4547	9.0925
150.	05/015	01/326	5.8481	1.2594	0.4478	13.6297
151.	04/373	03/088	5.8494	1.3712	5.3373	9.2001
152.	04/322	03/169	6.8724	1.3836	6.2201	8.6247
153.	08/375	03/088	4.7739	1.1909	3.1541	10.7211
154.	04/247	05/249	4.6719	1.3234	3.8531	5.6530
155.	04/341	04/172	6.7854	1.3824	6.2338	6.8929
156.	09/343	05/160	5.8218	1.3748	5.3041	8.8101
157.	06/376	02/160	5.9392	1.3598	5.4412	7.4625
158.	07/382	02/160	7.8050	1.2723	6.3278	7.2668
159.	05/025	01/262	5.8901	1.3555	5.4831	7.2968
160.	05/030	01/381	7.9413	1.3504	7.5294	9.2605
161.	05/063	01/381	2.7991	1.5752	2.3009	9.5462
162.	10/069	05/249	6.5932	1.4709	5.4049	7.4789
163.	12/027	01/262	9.8377	1.2783	9.2705	6.7436
164.	08/086	01/410	6.8280	1.2646	4.3994	7.7091
165.	08/409	01/318	2.9306	1.3277	2.7428	13.0252
166.	08/023	01/381	2.9360	1.5495	2.5384	13.5802
167.	06/200	01/182	5.0346	1.1816	4.2332	9.6558
168.	06/022	01/410	0.8448	1.3577	0.4637	9.6537
169.	08/048	02/318	4.8733	1.4530	2.5067	10.0535
170.	08/008	02/321	7.7764	1.3951	7.1153	7.8721
171.	08/061	02/015	8.8023	1.2762	8.2916	6.5298
172.	08/067	02/015	5.9084	1.4524	5.5117	9.0978
173.	07/028	01/381	6.8620	1.3536	6.5019	8.6677
174.	07/044	01/326	5.8680	1.4715	5.3334	9.8630
175.	07/082	01/318	4.8713	1.3538	4.5000	9.6492
176.	06/008	01/262	4.9687	1.6648	4.3932	11.3557
177.	03/331	03/179	7.9287	1.3680	7.3648	9.3929
178.	06/185	01/037	4.8775	1.1630	4.4129	11.5381
179.	07/160	01/182	6.8902	1.3468	6.5645	13.0904
180.	06/101	04/172	5.8435	1.3647	5.3983	11.8807
181.	06/174	03/006	6.9489	1.3440	6.5891	9.4160
182.	06/256	02/038	2.8328	1.2708	2.3415	9.6340
183.	08/349	02/314	3.8633	1.3504	3.5314	10.6994
184.	06/327	01/262	11.0103	1.2474	10.5554	5.4697
185.	05/008	01/262	7.4801	1.3685	3.3612	12.7738
186.	04/013	02/015	8.8688	1.3590	6.4508	7.6969
187.	04/025	01/381	4.8764	1.3526	4.5104	7.2524
188.	06/335	04/172	7.7842	1.2807	6.2500	5.1136
189.	07/166	01/410	6.8629	1.2813	6.2415	7.4661
190.	04/323	02/318	7.9122	1.2495	7.5383	6.6217
191.	04/324	01/262	2.9113	1.3405	2.6228	9.5208
192.	05/387	02/318	7.0421	1.2451	6.5762	5.8380
193.	05/350	02/318	6.3033	1.3500	5.5218	7.6181
194.	05/324	03/321	7.9113	1.3405	5.6228	5.8208
195.	05/310	02/275	7.9444	1.1507	7.5266	7.5518
196.	06/301	02/209	4.9142	1.3388	5.6395	8.0349
197.	06/321	01/262	2.8296	1.1187	1.8917	3.0212
198.	07/329	01/319	7.8428	1.2678	6.3689	9.1481
199.	07/350	02/209	5.9044	1.3539	4.4981	9.7891
200.	07/325	03/231	6.4403	1.3350	5.6584	7.6356
201.	08/303	02/175	1.8499	1.1566	1.4741	13.1569
202.	08/343	03/323	4.0793	1.3350	3.6693	9.0802
203.	08/330	01/178	7.7244	1.3019	6.0526	7.3909
204.	10/328	02/319	7.8434	1.2633	5.4113	8.3950
205.	06/308	02/321	9.8638	1.2515	8.5217	10.9873
206.	04/331	02/275	5.8747	1.2468	3.5636	8.1188
207.	02/345	01/191	5.9306	1.2378	4.6483	6.9163
208.	06/312	03/231	8.9261	1.2531	8.5064	7.5584
209.	07/303	03/231	3.8499	1.1566	3.4741	11.1569
210.	03/262	02/209	7.8854	1.2500	7.5345	6.2643
211.	03/264	02/275	5.8126	1.3753	5.2935	8.8210
212.	10/230	05/191	5.8758	1.3471	5.5625	10.7134
213.	06/218	01/207	4.8697	1.1486	4.5486	7.1010
214.	05/210	04/178	8.9265	1.2479	5.5533	6.1140
215.	09/205	01/207	6.9068	1.4472	6.5603	6.9566
216.	02/276	02/209	6.8723	1.1472	5.5620	7.7189
217.	09/204	01/181	8.8882	1.3469	8.5642	8.6937
218.	05/220	04/178	5.9258	1.2410	4.6184	10.2902
219.	09/209	04/178	5.1267	1.2335	4.6825	11.8124
220.	06/229	01/232	3.8957	1.2398	2.6304	9.4568
221.	10/189	04/178	5.8678	1.2500	4.5353	10.5960
222.	09/160	04/157	5.9249	1.8420	3.6085	12.6804
223.	10/160	04/157	8.9129	2.0457	8.5742	8.1620
224.	10/149	01/091	5.9135	1.9513	5.5222	10.1010
225.	05/145	01/100	3.8713	2.0538	2.5000	6.1492
226.	04/179	01/091	6.8872	1.3472	6.5608	7.0315
227.	04/188	02/209	4.8319	1.0625	4.4195	6.8254
228.	07/178	01/173	5.9386	1.3442	5.5876	11.9324
229.	03/174	02/103	5.8528	1.5548	5.4908	9.6710
230.	06/078	01/100	9.9071	1.8694	9.3520	10.6159
231.	06/080	02/103	4.9207	1.5320	4.7023	10.0958
232.	06/081	02/103	9.8594	1.2588	8.4527	7.2155
233.	08/093	08/265	7.9770	1.8459	7.5702	9.1451
234.	09/130	02/103	8.9065	1.5538	8.4984	7.3158
235.	09/267	11/002	9.9736	1.4529	5.5046	9.6754
236.	11/181	01/091	8.8230	1.2664	8.3824	5.0985
237.	12/181	01/091	7.9777	1.3428	5.5996	8.7777
238.	08/180	01/181	6.8768	1.3474	6.5593	9.8079
239.	07/218	01/091	8.9150	1.1370	8.6559	8.4523
240.	08/158	01/181	5.9313	1.3634	5.4075	9.7376
241.	06/175	01/178	3.8704	1.3548	3.4901	10.0394
242.	06/205	01/091	9.8816	1.9529	9.5079	6.7404
243.	09/321	02/275	7.9041	1.2410	7.6185	7.3284
244.	10/057	01/059	6.8737	1.3471	5.5622	7.2166
245.	06/047	02/051	6.8588	1.3526	5.5112	6.4841
246.	10/047	01/059	5.8558	1.5537	5.5010	11.4776
247.	05/047	02/051	10.8598	1.2529	10.5081	10.4786
248.	04/012	008620	6.9681	1.8565	5.4727	8.7821
249.	02/012	008620	8.1468	1.7477	3.5486	7.7228
250.	05/016	02/017	7.9985	1.3532	7.5016	8.5284
251.	10/017	03/027	6.9283	1.5551	6.4852	7.3323
252.	09/019	008620	8.8648	1.7511	6.5251	8.8895
253.	03/020	06/265	7.8809	1.4466	7.5664	9.1090
254.	02/004	01/265	8.8758	1.1478	1.5560	10.5057
255.	08/005	01/265	4.9595	1.4466	1.5645	7.0691

I_1=Age at farrowing I_2=Post weaning conception period I_1=Litter size at birth I_2=Average weight of a piglet at birth I_3=Litter size at weaning I_4=Average weight of a piglet at weaning

Appendix 2(b)

Phenotypic index ($I=Y-b_1X_1-b_2X_2$) of pigs based on one main character and two auxiliary characters in the second parity

Sl. No.	Dam no.	Sire no.	$I_{1,12}$ vs Y_1 X_1&X_2	$I_{2,12}$ vs Y_2 X_1&X_2	$I_{3,12}$ vs Y_3 X_1&X_2	$I_{4,12}$ vs Y_4 X_1&X_2
1.	04/196	02/036	6.4109	1.1323	6.4693	9.0283
2.	07/199	02/036	8.2167	1.0426	8.2484	6.0314
3.	08/256	01/054	6.4508	1.1578	6.4754	9.1563
4.	03/268	01/184	7.4058	1.2555	5.4317	11.1715
5.	04/287	01/184	6.9847	1.1948	6.0247	8.0710
6.	04/295	04/051	7.3667	1.2250	4.3949	11.9543
7.	06/298	02/036	8.5835	1.1175	8.6020	8.5682
8.	06/333	01/280	5.3353	1.2135	3.3647	9.2542
9.	05/341	02/036	8.5361	1.1988	8.5567	6.4667
10.	03/353	03/031	8.3099	1.2691	6.3380	6.9233
11.	06/023	01/054	8.5619	1.3052	8.5815	5.9635
12.	08/023	02/141	6.4202	1.2113	4.4754	13.0088
13.	04/027	02/036	7.4147	1.2956	4.4388	13.2107
14.	04/040	03/392	9.4851	1.3016	9.5070	8.9896
15.	08/041	01/054	7.4626	1.1708	5.4863	8.0656
16.	04/042	04/051	7.3302	1.2138	4.3876	11.6529
17.	06/137	02/036	10.4321	1.0777	10.4564	9.9848
18.	08/137	01/138	7.6508	1.1249	7.6990	9.6333
19.	05/139	03/031	8.4006	1.1661	8.4263	10.1847
20.	06/140	04/371	7.6014	1.2749	6.6491	8.0058
21.	04/141	04/371	5.6370	1.2571	4.6526	10.2895
22.	05/143	02/137	9.4054	1.2482	6.4278	7.4703
23.	06/143	02/137	8.4438	1.0907	8.4673	8.4941
24.	04/144	03/392	7.3686	1.0388	3.3962	6.9682
25.	05/144	02/036	2.4097	1.1599	1.4353	11.4746
26.	09/150	04/371	10.4507	1.2041	10.4735	7.0057
27.	06/153	01/138	8.2398	1.1659	7.2700	8.6472
28.	09/153	02/137	8.5070	1.2037	5.5282	9.3833
29.	04/156	01/138	6.2360	0.8932	6.3273	9.8479
30.	05/162	04/371	4.5296	1.2113	4.5499	9.5826
31.	05/164	01/140	5.5742	1.2108	5.5933	11.5646
32.	07/166	03/392	1.0462	1.2560	1.0822	15.3122
33.	08/174	03/392	10.4414	1.1612	8.4660	7.7637
34.	07/175	02/036	8.2897	1.1909	8.3175	11.0544
35.	07/177	02/137	5.3850	1.1849	5.4104	10.2108
36.	08/198	02/036	9.5609	1.2099	8.5803	6.7689
37.	06/200	02/143	8.4624	1.2172	8.4844	8.5150
38.	07/203	03/392	11.4527	1.1947	9.4758	8.1949
39.	05/210	01/140	5.5577	1.2111	5.5772	10.0714
40.	09/211	01/054	6.4822	1.0925	2.5045	8.3811
41.	04/212	04/371	6.6367	1.0547	5.6842	10.1705
42.	10/233	04/371	8.4880	1.2106	7.5095	9.8981
43.	09/237	01/138	8.9722	1.1717	9.0096	8.4578
44.	06/252	03/392	5.3700	1.2600	3.3967	11.0902
45.	07/271	01/138	7.5479	1.2118	3.5576	9.6760
46.	08/280	01/138	8.5124	1.2190	7.5329	9.9975
47.	07/287	02/137	6.5443	1.1102	5.5643	7.0757
48.	06/288	01/138	4.3950	1.0971	3.4196	9.6199
49.	04/291	03/392	4.4817	1.1768	4.5046	8.3645
50.	06/294	03/392	8.5269	1.0920	7.5480	7.3631
51.	07/295	04/371	10.5410	1.1984	6.5615	8.1644
52.	07/306	04/371	5.5446	1.1000	5.5649	9.5647
53.	08/310	03/392	9.4428	1.1954	7.4662	8.4995
54.	07/319	01/184	8.4910	1.0965	8.5130	7.3819
55.	03/335	01/138	7.5543	1.1224	4.5735	10.9848
56.	08/360	01/138	4.5509	1.2338	4.5698	10.8982
57.	10/367	03/011	9.5466	1.1267	8.5659	5.9923
58.	09/371	04/371	6.5309	1.2325	6.5503	9.2047
59.	06/187	04/051	8.3262	1.1197	8.3557	7.3644
60.	07/188	04/172	5.4805	1.7686	5.5038	9.4562
61.	02/191	01/037	8.3430	1.0453	6.3711	9.3851
62.	06/331	03/179	7.5632	1.2264	7.5820	8.8856
63.	06/253	04/172	8.5033	0.8891	8.5252	8.6692
64.	06/256	01/182	6.5329	1.1904	6.5539	9.8590
65.	07/177	01/037	5.3690	1.0416	5.3965	10.7709
66.	07/009	04/051	9.4901	0.7780	9.5128	10.4626
67.	03/374	01/410	2.3535	0.8371	2.3815	9.2723
68.	04/201	01/084	6.3214	1.0562	6.3496	13.0051
69.	06/047	01/410	5.4323	1.2675	5.4570	8.9739
70.	07/287	02/038	10.3367	1.1476	9.3649	7.8900
71.	07/189	04/051	4.1097	1.1356	4.1446	10.6658
72.	03/191	02/038	3.3962	1.1460	3.4227	13.8651
73.	07/082	04/172	6.5836	0.8305	6.6017	10.0819
74.	08/072	01/037	9.4237	0.7533	7.4492	9.9621
75.	06/090	03/088	2.5609	0.8099	2.5803	10.2689
76.	06/084	03/088	7.5701	0.9071	6.5894	9.4623
77.	07/294	02/036	2.4736	1.2783	2.4967	10.4693
78.	07/180	02/036	5.1414	1.0138	5.1763	10.3302
79.	02/248	01/053	8.5206	1.0943	8.5418	10.1680
80.	06/255	03/265	9.4404	1.1660	8.4649	6.7691
81.	04/271	02/036	9.4968	1.0785	9.5193	7.2604
82.	03/272	02/036	6.4866	1.2765	6.5094	7.2622
83.	08/098	03/246	4.6465	1.1536	3.6619	12.4821
84.	09/082	01/182	6.2498	0.8013	6.2783	9.9811
85.	07/340	01/182	5.4771	0.8799	5.5001	8.4696
86.	06/371	02/160	1.5711	0.9119	1.5902	8.6671
87.	05/015	01/319	4.5870	1.2191	4.6054	9.0685
88.	08/375	04/172	3.3557	0.8407	2.3835	12.9752
89.	08/067	03/088	7.5701	1.1166	3.5890	10.2725
90.	07/028	01/262	7.2625	1.0096	7.2904	7.0849
91.	03/331	03/392	9.3906	1.2539	9.4170	6.4756
92.	06/185	02/038	6.5424	0.8964	4.5629	11.3618
93.	07/160	01/182	8.6235	0.8433	7.6400	12.0800
94.	08/166	03/246	1.6082	0.9287	1.6257	18.9704
95.	06/146	04/371	6.5329	1.1904	6.5539	9.8590
96.	04/013	01/381	7.3521	1.0984	5.3779	7.0381
97.	04/324	02/231	4.2937	1.1314	4.3199	10.1960
98.	05/387	02/321	5.9670	0.9461	6.0055	8.3326
99.	05/324	03/231	1.6550	1.2549	1.6701	12.4801
100.	05/310	01/262	6.2063	1.0869	6.2366	8.5827
101.	06/301	03/313	3.6008	1.1589	3.6173	10.9054
102.	06/321	03/313	8.4912	0.9329	6.5436	7.4041
103.	07/342	02/209	6.2284	1.0381	6.2561	8.1286
104.	08/330	05/083	6.0108	1.0040	6.0497	8.5706
105.	10/334	01/262	9.3146	0.9151	8.3408	8.0704
106.	10/328	01/262	4.3858	1.0311	4.4132	11.7532
107.	05/242	01/191	7.8019	1.1340	7.8099	8.9070
108.	08/334	02/275	4.7056	1.1854	4.7182	11.3928
109.	04/331	05/191	4.1377	1.0179	4.1688	8.1424
110.	02/345	04/321	6.6701	1.0565	6.6848	11.9759
111.	07/285	02/314	9.4038	1.0243	9.4271	8.0454
112.	07/254	03/321	5.6493	1.0497	2.6648	10.2768
113.	04/215	01/191	3.1703	1.0377	3.1997	9.1508
114.	03/262	03/313	3.5787	1.1308	3.5969	10.8842
115.	09/209	01/178	6.4962	1.0859	6.5184	8.6686
116.	09/255	02/314	5.3255	1.1096	5.3516	9.6604
117.	10/160	04/157	8.5692	1.1343	8.5876	8.9916
118.	06/179	02/209	4.5999	1.0404	4.6171	8.4861
119.	03/174	01/091	4.6224	1.0350	4.6392	8.1717
120.	05/183	01/091	9.6593	1.0620	4.6740	10.9860
121.	06/080	01/091	7.2081	1.0470	7.2361	9.2460
122.	08/180	01/091	9.6524	0.9486	8.6679	6.5744
123.	07/167	01/178	4.5737	1.0544	4.5911	11.6112
124.	05/231	01/191	2.5127	1.0857	2.5345	14.9618
125.	03/004	08/265	7.6630	1.0534	6.6780	6.7753
126.	02/004	08/002	10.6591	1.0490	6.6744	6.8722

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix 2(c)

Phenotypic index ($I=Y-b_1X_1-b_2X_2$) of pigs based on one main character and two auxiliary characters in the third parity

Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $X_1\&X_2$	$I_{2,12}:Y_2$ $X_1\&X_2$	$I_{3,12}:Y_3$ $X_1\&X_2$	$I_{4,12}:Y_4$ $X_1\&X_2$	Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $X_1\&X_2$	$I_{2,12}:Y_2$ $X_1\&X_2$	$I_{3,12}:Y_3$ $X_1\&X_2$	$I_{4,12}:Y_4$ $X_1\&X_2$	Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $X_1\&X_2$	$I_{2,12}:Y_2$ $X_1\&X_2$	$I_{3,12}:Y_3$ $X_1\&X_2$	$I_{4,12}:Y_4$ $X_1\&X_2$
1.	07/253	01/184	3.7547	1.0616	3.2748	10.6215	25.	03/268	02/036	4.7080	1.0223	5.1506	11.5643	49.	06/200	06/018	3.3374	0.9149	3.6986	12.1966
2.	07/188	01/184	5.6938	1.5440	5.1995	10.9422	26.	04/287	03/392	3.2072	0.7880	4.0669	11.2243	50.	07/209	03/392	4.0437	0.8803	4.4652	10.0393
3.	03/331	03/392	6.8741	1.0640	7.3399	8.6898	27.	04/295	01/280	1.3800	0.9741	0.8651	9.8080	51.	05/210	01/138	2.2041	1.0147	2.6327	11.5508
4.	07/160	01/182	4.6989	0.6659	5.0078	11.6219	28.	06/298	03/392	6.2839	1.0265	4.7021	10.2915	52.	04/212	03/006	6.6623	0.9933	5.3114	11.6187
5.	06/084	01/037	5.2545	0.6092	5.6432	11.3766	29.	06/333	01/054	5.7730	0.7496	5.5038	13.0427	53.	10/233	02/036	4.1578	0.8058	1.5868	11.6791
6.	07/180	02/038	2.4559	0.9809	1.9200	14.2393	30.	05/341	02/036	4.4754	1.0786	5.6903	11.1537	54.	07/271	01/140	5.0827	0.9098	4.5604	12.1778
7.	05/184	01/280	4.4085	0.8804	3.8955	12.0929	31.	03/353	01/054	3.7138	0.9297	3.1724	11.3784	55.	05/308	01/318	2.9580	1.2062	3.2389	13.5356
8.	02/248	04/371	4.4561	0.9803	5.1764	12.7209	32.	06/023	01/054	0.1518	1.1058	0.5868	12.4791	56.	04/323	01/317	5.6053	0.8565	4.9374	10.8037
9.	06/153	01/138	3.7547	1.0616	3.2748	10.6215	33.	01/023	02/036	6.5716	0.8021	6.5401	11.3251	57.	05/324	01/319	5.3075	0.8861	5.8675	10.2332
10.	06/255	01/184	4.8074	1.0391	3.2428	8.8965	34.	04/040	02/137	-1.0116	1.1130	-0.9690	15.2563	58.	06/301	01/318	0.9878	1.0592	1.3831	15.1441
11.	05/256	01/184	-2.3212	1.1547	-1.7801	16.5901	35.	08/041	02/036	1.9435	0.9526	2.3445	13.9771	59.	06/321	01/326	2.4658	1.0368	0.3340	10.9770
12.	04/271	01/054	2.8633	1.0603	3.5249	15.3917	36.	06/137	02/036	3.4822	0.9539	2.1212	11.4157	60.	08/303	01/317	6.3872	0.8481	6.8088	7.2332
13.	03/272	01/037	7.7508	0.9567	6.2603	10.5121	37.	08/137	02/036	7.4329	0.8510	6.0894	13.8646	61.	08/343	01/262	6.7709	0.7921	5.3614	10.5190
14.	08/166	04/172	4.9071	0.6553	4.5913	12.9103	38.	04/141	01/138	1.2018	1.1802	0.8039	10.3310	62.	10/328	01/322	1.7756	0.8079	2.4045	10.6284
15.	08/038	03/246	4.8072	0.6840	5.1077	14.0476	39.	05/143	01/184	4.8358	0.9903	5.1381	9.8325	63.	07/254	02/314	5.8230	0.8842	6.1159	10.9297
16.	03/191	02/038	4.4987	0.9153	2.0297	9.4871	40.	06/143	03/031	6.9925	0.8750	7.4262	9.6836	64.	04/215	02/314	4.1528	0.8093	4.5936	10.1950
17.	07/082	01/037	5.4307	0.6437	5.8188	14.3702	41.	09/150	04/371	8.9744	0.8817	5.4605	10.9521	65.	09/218	01/191	1.5837	0.8490	1.9075	12.4075
18.	08/072	02/038	6.7307	0.6214	5.1593	9.6352	42.	09/153	02/137	5.1293	0.9994	2.5564	15.9961	66.	09/209	02/231	-1.2813	0.9732	-0.6639	15.4800
19.	06/185	01/037	5.2187	0.8972	4.1035	13.6442	43.	05/162	03/392	1.9178	1.0093	2.4781	13.6677	67.	09/255	01/317	4.2010	0.7685	2.5294	11.4433
20.	09/371	01/140	4.6989	0.6659	5.0078	11.6219	44.	05/164	01/140	4.9178	1.0093	1.4781	15.2677	68.	07/261	01/262	5.7105	0.9806	4.0513	12.0500
21.	06/256	02/038	5.1335	1.0849	5.5211	8.7461	45.	08/174	03/392	5.6456	0.7326	6.1464	10.5658	69.	07/218	02/209	8.6470	0.7732	9.5098	10.7628
22.	04/196	01/184	3.9240	0.9027	2.4569	13.6345	46.	07/175	04/371	7.9847	0.9652	6.3971	10.9648	70.	11/265	08/002	7.4900	1.1395	5.8371	12.4894
23.	07/199	02/038	4.6833	0.9686	6.0174	11.5606	47.	07/177	02/137	4.8880	0.9618	5.3408	9.5673	71.	09/126	03/159	6.4950	0.9359	1.8303	14.8734
24.	08/256	03/392	8.5042	0.9159	5.5427	9.0425	48.	08/198	02/036	7.3443	0.9138	7.6991	11.2854							

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix 2(d)

Phenotypic index ($I=Y-b_1X_1-b_2X_2$) of pigs based on one main character and two auxiliary characters in the fourth parity

Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $_{Vs}$ $X_1\&X_2$	$I_{2,12}:Y_2$ $_{Vs}$ $X_1\&X_2$	$I_{3,12}:Y_3$ $_{Vs}$ $X_1\&X_2$	$I_{4,12}:Y_4$ $_{Vs}$ $X_1\&X_2$	Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $_{Vs}$ $X_1\&X_2$	$I_{2,12}:Y_2$ $_{Vs}$ $X_1\&X_2$	$I_{3,12}:Y_3$ $_{Vs}$ $X_1\&X_2$	$I_{4,12}:Y_4$ $_{Vs}$ $X_1\&X_2$	Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $_{Vs}$ $X_1\&X_2$	$I_{2,12}:Y_2$ $_{Vs}$ $X_1\&X_2$	$I_{3,12}:Y_3$ $_{Vs}$ $X_1\&X_2$	$I_{4,12}:Y_4$ $_{Vs}$ $X_1\&X_2$
1.	04/196	01/054	3.2542	1.2238	0.2223	9.0452	10.	06/023	02/036	4.5828	1.2892	2.7771	12.6426	18.	08/072	04/017	10.3250	1.1713	6.8499	5.4977
2.	08/256	01/184	8.3988	1.0677	2.9721	9.4132	11.	04/040	02/143	5.1369	1.1651	0.6954	13.6071	19.	07/160	01/037	6.5011	1.1314	1.6773	9.7787
3.	03/268	02/137	7.0448	1.2675	2.6899	7.7383	12.	04/141	01/138	5.4959	1.2196	3.5265	9.2250	20.	05/308	02/314	8.5401	1.0469	5.8874	9.2077
4.	04/287	01/184	7.7540	0.9912	4.6121	7.0216	13.	05/143	03/392	4.2929	1.1172	0.4141	10.9732	21.	04/324	01/381	7.4432	1.1182	3.4875	13.0855
5.	04/295	02/036	5.2766	1.2522	2.5890	13.9617	14.	06/143	01/038	8.4274	0.8925	4.1569	7.9740	22.	05/324	01/262	9.2983	1.0193	2.4431	6.9772
6.	01/298	03/392	9.1673	1.2063	2.2275	6.2794	15.	05/162	06/018	7.4639	0.9972	5.2308	8.7513	23.	10/328	03/088	7.4004	1.0915	3.1338	7.7038
7.	06/333	03/392	6.9834	1.1075	4.5089	8.1953	16.	06/200	06/018	7.4744	1.1111	5.4105	6.3090	24.	02/345	01/262	4.3169	1.1364	2.6663	6.7410
8.	05/341	01/280	4.1905	1.2475	3.2947	9.7043	17.	05/184	03/312	1.4044	1.2931	-0.8444	15.2068	25.	09/255	01/410	6.9700	1.0543	2.6922	9.1371
9.	03/353	04/051	7.1774	1.1714	3.7909	10.6873														

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix 2(e)

Phenotypic index ($I=Y-b_1X_1-b_2X_2$) of pigs based on one main character and two auxiliary characters in the fifth parity

Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $_{Vs}$ $X_1\&X_2$	$I_{2,12}:Y_2$ $_{Vs}$ $X_1\&X_2$	$I_{3,12}:Y_3$ $_{Vs}$ $X_1\&X_2$	$I_{4,12}:Y_4$ $_{Vs}$ $X_1\&X_2$	Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $_{Vs}$ $X_1\&X_2$	$I_{2,12}:Y_2$ $_{Vs}$ $X_1\&X_2$	$I_{3,12}:Y_3$ $_{Vs}$ $X_1\&X_2$	$I_{4,12}:Y_4$ $_{Vs}$ $X_1\&X_2$	Sl. No.	Dam no.	Sire no.	$I_{1,12}:Y_1$ $_{Vs}$ $X_1\&X_2$	$I_{2,12}:Y_2$ $_{Vs}$ $X_1\&X_2$	$I_{3,12}:Y_3$ $_{Vs}$ $X_1\&X_2$	$I_{4,12}:Y_4$ $_{Vs}$ $X_1\&X_2$
1.	06/256	02/036	1.2148	1.2867	5.0366	12.0405	4.	06/298	02/143	3.0042	1.2870	6.4722	10.4352	7.	07/160	02/038	-0.1001	1.4089	4.6504	13.4101
2.	03/268	02/143	1.4525	1.4026	6.3164	13.4494	5.	06/023	03/392	3.6920	1.1883	5.4113	12.9305	8.	05/324	01/144	1.6495	1.2988	5.6320	10.2728
3.	04/295	02/036	0.0421	1.4030	4.2105	11.2468	6.	08/072	01/037	4.3059	1.3830	9.3249	9.4144							

X_1=Age at farrowing X_2=Post weaning conception period Y_1=Litter size at birth Y_2=Average weight of a piglet at birth Y_3=Litter size at weaning Y_4=Average weight of a piglet at weaning

Appendix 3(a)

Composite sow index ($I = I_a + I_b + I_c + I_d + I_e + I_f$) of pigs in the first parity

Sl. No.	Dam no.	Sire no.	I_a=1+ (12-X_1) *0.2	I_b=1+ (X_2-8) *0.2	I_c=1+ (X_3-1.25) *0.2	I_d=1+ (X_4-8) *0.2	I_e=1+ (X_5-9) *0.2	I_f=1+ (0.5-X_6) *0.2	I=I_a+I_b +I_d +I_e+I_f	Sl. No.	Dam no.	Sire no.	I_a=1+ (12-X_1) *0.2	I_b=1+ (X_2-8) *0.2	I_c=1+ (X_3-1.25) *0.2	I_d=1+ (X_4-8) *0.2	I_e=1+ (X_5-9) *0.2	I_f=1+ (0.5-X_6) *0.2	I=I_a+ I_c+I_e
1.	04/196	04/051	-3.3200	1.4000	1.0100	1.4000	1.3000	1.0000	2.7900	46.	10/233	04/371	0.2000	1.2000	1.0500	0.6000	0.7600	0.7200	4.53
2.	07/199	04/172	-1.7000	0.4000	0.9900	0.2000	2.2600	0.8800	3.0300	47.	09/237	02/137	-0.0600	0.6000	1.0500	0.6000	0.9200	0.6800	3.93
3.	08/256	01/182	-0.0800	1.0000	0.9500	0.8000	0.6800	-1.7600	1.5900	48.	08/250	01/138	-0.2600	0.6000	1.0500	0.2000	1.6000	0.3600	3.55
4.	03/268	04/172	-0.2400	0.8000	0.9500	0.8000	1.9800	-1.2400	3.0500	49.	06/252	03/392	-0.8400	0.4000	1.0300	0.4000	2.2400	0.2000	3.43
5.	04/287	01/182	-0.3200	-0.2000	0.9900	-0.2000	2.7000	-3.2000	-0.2300	50.	07/271	02/137	0.0400	0.6000	1.0900	0.6000	1.3000	0.8000	4.43
6.	04/295	01/037	-1.8400	1.2000	1.0500	0.6000	0.7600	0.1600	1.9300	51.	04/273	02/036	-1.5600	0.8000	1.0300	0.8000	1.3400	0.5600	2.97
7.	06/298	01/182	0.1000	1.0000	0.9700	1.0000	1.1800	0.8800	5.1300	52.	08/280	01/138	0.1600	0.8000	1.0100	0.6000	1.1800	-3.6800	0.07
8.	06/333	02/038	-0.9400	1.0000	1.0100	0.8000	1.0100	-2.1600	0.7900	53.	07/287	03/392	-0.2600	1.0000	1.0300	1.0000	0.6800	1.0400	4.49
9.	05/341	03/265	-0.4400	0.2000	1.0300	0.2000	1.4600	1.0400	3.4900	54.	06/288	04/051	-0.2400	1.0000	1.1100	0.2000	1.3800	1.0800	4.53
10.	03/353	02/036	-0.3200	1.2000	1.0300	0.8000	0.9000	-0.0800	3.5300	55.	04/291	03/031	-0.7600	0.4000	1.0300	0.4000	1.1400	0.6000	2.81
11.	06/023	04/371	-0.1600	1.2000	1.0300	0.8000	1.0000	0.7600	4.6300	56.	06/294	04/371	-0.6600	0.6000	1.0300	0.4000	1.7200	1.1600	4.25
12.	08/023	01/184	-0.0400	1.4000	1.0300	0.8000	0.8000	-0.5200	3.4700	57.	07/295	01/138	-0.4800	1.6000	1.0100	1.6000	0.4400	1.0800	5.25
13.	04/027	04/371	0.0200	1.0000	1.0300	0.6000	0.9000	0.3600	3.9100	58.	07/298	03/392	-0.2000	0.0000	1.0300	0.0000	1.3400	-1.0000	1.17
14.	04/040	02/036	-0.0600	1.0000	1.0500	1.0000	0.7800	0.6400	4.4100	59.	07/306	02/137	-0.3200	0.2000	1.0500	0.0000	1.1000	0.8800	1.91
15.	08/041	03/031	-1.0400	1.0000	1.0500	0.8000	1.2200	0.8800	3.9100	60.	08/310	02/143	-0.2200	0.8000	1.0500	0.4000	0.4000	0.8400	3.27
16.	04/042	02/036	-0.5000	1.0000	1.0500	0.6000	1.1000	-3.3200	-0.0700	61.	05/313	01/138	-0.1600	0.6000	1.0500	0.6000	2.0000	0.4000	4.49
17.	04/115	03/392	-3.4400	0.6000	1.0100	0.6000	0.8600	-0.8400	-1.2100	62.	06/313	04/371	-0.3200	0.6000	1.0500	0.4000	0.6400	-0.0800	2.29
18.	06/137	02/143	-0.6400	1.0000	1.0500	0.6000	1.4400	-1.8400	1.6100	63.	08/318	03/392	-0.1600	0.6000	1.0300	0.6000	0.4800	-0.2400	2.31
19.	08/137	02/037	-0.7600	0.6000	1.0500	0.4000	1.1000	0.7200	3.1100	64.	07/319	01/138	-0.1600	0.4000	1.0500	0.2000	0.9000	0.5200	2.91
20.	05/139	04/371	0.0200	1.2000	1.0500	0.8000	1.1000	-0.8800	3.2900	65.	07/321	02/143	0.2200	1.0000	1.0300	1.0000	0.4400	0.3200	4.01
21.	06/140	04/371	0.7600	0.8000	1.0500	0.2000	0.9000	0.8400	4.5500	66.	03/335	02/143	0.2800	1.0000	1.0300	1.0000	0.9400	0.9600	5.21
22.	04/141	03/031	0.8000	-0.2000	1.0500	-0.4000	1.6000	0.7200	3.5700	67.	11/340	02/143	-0.0600	1.4000	1.0300	1.4000	0.6600	0.0400	4.47
23.	05/143	02/036	0.5400	0.4000	1.0500	0.2000	1.7000	0.3200	4.2100	68.	10/367	02/143	0.3400	1.0000	1.0300	0.6000	0.2600	1.1200	4.35
24.	06/143	02/137	-0.1000	0.4000	1.0500	0.4000	1.1000	0.2400	3.0900	69.	07/375	02/036	0.0800	1.6000	0.9900	0.2000	0.9800	0.6400	4.69
25.	04/144	02/143	0.0400	1.6000	1.0500	0.0000	1.4800	-2.4000	1.7700	70.	07/376	01/138	-0.5800	0.2000	1.0300	0.2000	1.5200	0.4000	2.77
26.	05/144	03/392	-1.3600	1.0000	1.0100	1.0000	0.7200	1.0800	3.4500	71.	07/380	01/184	-0.8800	1.0000	1.0100	0.4000	0.7200	0.8800	3.13
27.	08/146	02/137	-2.2400	1.0000	1.0300	0.8000	0.7400	0.2000	1.5300	72.	06/390	03/011	-0.4000	1.4000	1.0300	0.6000	0.9800	1.1200	4.73
28.	09/150	03/392	-0.0800	1.0000	1.0500	0.4000	0.7000	0.9600	4.0300	73.	07/023	01/140	0.4400	1.4000	1.0100	0.6000	0.3400	1.0400	4.83
29.	06/153	01/138	-0.7600	0.6000	1.0500	0.6000	0.9800	-3.8800	-1.4100	74.	08/029	01/040	0.0400	0.4000	1.0100	0.0000	0.6000	1.0000	3.05
30.	09/153	01/138	-0.0600	1.8000	1.0300	1.6000	0.8000	0.6800	5.8500	75.	08/034	02/143	-0.2800	1.2000	1.0100	1.2000	0.6000	0.5200	4.25
31.	04/155	01/184	-0.7600	1.0000	1.0300	0.8000	1.1800	-3.6000	-0.3500	76.	07/038	03/006	-0.2400	1.2000	1.0100	1.0000	0.8600	0.5600	4.35
32.	05/162	01/184	-0.0400	1.0000	1.0500	0.6000	0.6000	1.0000	4.2100	77.	06/040	01/003	-0.1600	0.4000	1.0300	0.4000	0.9600	0.6000	3.23
33.	05/164	01/140	-0.0400	0.8000	1.0500	0.6000	1.4600	0.8000	4.6700	78.	04/044	03/392	-0.3000	1.2000	0.9900	0.8000	0.7400	0.6800	4.11
34.	07/166	04/371	-0.7200	0.8000	1.0500	0.6000	1.2400	1.0000	3.9700	79.	09/046	02/143	-0.1400	1.0000	1.0300	0.8000	0.8400	0.9200	4.45
35.	07/171	02/143	-0.5800	-0.2000	1.0500	-0.4000	1.0000	-0.8000	0.0700	80.	06/067	02/143	0.0200	1.0000	1.0300	1.0000	0.9000	1.0800	5.03
36.	08/174	02/036	-0.3000	0.4000	1.0300	0.4000	1.9200	-1.0800	2.3700	81.	06/069	02/143	0.8800	0.0000	1.0300	0.0000	1.7400	0.3600	4.01
37.	07/175	02/036	-0.1600	1.0000	1.0500	0.6000	1.0400	1.0400	4.5700	82.	06/070	02/143	0.2400	1.0000	1.0300	1.0000	0.3200	0.1200	3.71
38.	07/177	03/392	-0.1000	0.6000	1.0500	0.6000	1.0000	0.2800	3.4300	83.	05/071	02/143	0.3400	0.4000	1.0300	0.4000	1.3200	1.1200	4.61
39.	08/198	03/392	-0.0600	1.2000	1.0500	0.8000	0.5400	0.8000	4.3300	84.	05/073	02/143	0.8400	0.4000	1.0300	-0.2000	1.4000	0.8000	4.27
40.	06/200	02/137	0.1200	0.4000	1.0300	0.4000	0.9000	1.1200	3.9700	85.	07/082	01/140	0.4800	1.2000	1.0300	1.0000	0.4800	0.2800	4.47
41.	03/208	04/371	-0.5400	0.4000	1.0500	0.2000	1.5600	-0.3200	2.3500	86.	04/087	03/011	0.4200	1.0000	1.0300	0.4000	1.2000	0.5200	4.57
42.	07/209	04/051	0.1600	1.2000	1.0300	1.2000	0.9000	-0.1200	4.3700	87.	06/104	01/003	0.6200	0.8000	1.0100	0.2000	1.2600	0.5600	4.45
43.	05/210	01/140	-0.0400	1.2000	1.0300	1.0000	0.8800	0.9200	4.9900	88.	07/253	02/038	-0.0600	0.8000	0.9500	0.6000	0.9000	-0.4000	7.79
44.	09/211	02/143	-0.7600	1.2000	1.0300	0.2000	0.6200	0.8800	3.1700	89.	04/258	04/172	-0.2200	1.0000	0.9700	1.0000	1.0800	-0.1200	3.71
45.	04/212	04/371	0.1200	1.0000	1.0500	1.0000	0.4800	0.8000	4.4500	90.	02/248	02/038	-0.3800	0.4000	0.9500	0.4000	1.5600	-1.6400	1.29

Appendix 3(a) continues

Sl. No.	Dam no.	Sire no.	$I_a=1+(12-\bar{I}_1)\pm0.2$	$I_b=1+(\bar{I}_2-8)\pm0.2$	$I_c=1+(\bar{I}_3-1.25)\pm0.2$	$I_d=1+(\bar{I}_4-8)\pm0.2$	$I_e=1+(\bar{I}_5-9)\pm0.2$	$I_f=1+(0.5-I_6)\pm0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$
91.	03/183	01/056	-0.2800	1.2000	0.9500	1.0000	1.8200	0.9200	5.6100
92.	05/168	01/182	1.1200	1.2000	0.9900	0.6000	1.1000	-0.1200	4.8900
93.	06/187	04/172	-1.2000	0.8000	0.9500	0.8000	1.4000	-1.2400	1.5100
94.	07/188	01/037	-1.2000	0.6000	0.9500	0.6000	1.1600	1.0400	3.1500
95.	02/191	01/182	-0.9800	0.6000	0.9500	0.6000	1.2400	-0.2400	2.1700
96.	02/043	02/036	-0.3400	1.0000	1.0500	1.0000	0.7600	1.0000	4.4700
97.	06/283	01/184	-2.2200	1.4000	1.0300	0.6000	0.4000	0.4400	1.6500
98.	06/287	01/054	-0.5400	1.0000	0.9900	1.0000	1.3200	-0.3200	3.4500
99.	04/292	04/172	-0.5000	1.2000	0.9700	1.0000	1.1600	1.0800	4.9100
100.	06/331	01/037	-0.3600	1.0000	0.9900	0.6000	1.2400	0.9600	4.4300
101.	06/253	03/051	-0.5000	1.0000	0.9700	0.6000	1.4600	0.7200	4.2300
102.	06/256	02/038	-1.6600	0.0000	0.9900	0.0000	2.5400	0.8000	2.6700
103.	07/009	01/182	-0.6800	0.4000	0.9700	0.4000	1.6800	0.6000	3.3700
104.	06/034	04/172	0.3400	0.2000	0.9700	0.2000	0.9000	0.7600	3.3700
105.	03/374	01/182	-1.6000	0.8000	0.9500	0.8000	1.5800	0.5600	3.1100
106.	04/201	03/179	-0.7400	1.0000	0.9500	1.0000	1.5600	0.0000	3.7700
107.	06/047	01/326	0.3200	0.6000	1.0100	0.6000	0.7200	-1.8800	1.1700
108.	07/373	02/160	-1.0000	0.0000	0.9900	-0.2000	1.2000	1.0800	2.0700
109.	06/340	04/172	-0.6400	0.6000	1.0100	0.6000	1.2800	-0.8000	2.0500
110.	05/005	01/037	-0.1400	1.0000	1.0300	1.0000	1.0000	-0.0400	3.8500
111.	10/351	02/036	-0.5600	0.2000	1.0300	0.2000	1.6200	-0.7200	1.7700
112.	03/284	01/184	-2.6800	0.6000	1.0500	0.6000	0.6400	-0.2400	-0.0300
113.	04/358	02/036	0.4400	0.4000	0.9900	0.4000	0.7600	1.1200	4.1100
114.	07/284	01/054	-0.8000	0.6000	1.0100	0.6000	1.4800	-2.2400	0.6500
115.	07/287	01/054	-1.6000	0.6000	1.0100	0.6000	1.2600	1.1200	2.9900
116.	07/189	01/037	-1.5400	0.2000	0.9700	0.0000	2.0000	0.3600	1.9900
117.	03/191	01/037	-1.6600	-0.2000	0.9900	-0.2000	1.8000	1.0000	1.7300
118.	07/082	01/410	0.8600	0.0000	0.9700	0.0000	0.8400	0.3200	2.9900
119.	08/072	01/037	-1.5000	0.8000	0.9500	0.8000	1.0400	1.0000	2.8900
120.	08/085	03/088	-1.0000	0.4000	0.9700	0.4000	1.6400	0.7200	3.1300
121.	02/091	03/088	-1.0000	0.6000	0.9700	0.6000	1.4200	1.0800	3.6700
122.	06/105	03/088	0.7400	0.8000	0.9900	0.8000	1.8600	-2.2000	2.9900
123.	05/115	04/172	0.0600	0.2000	1.0300	0.0000	1.0000	0.5600	2.8500
124.	06/090	03/088	0.1400	0.6000	0.9900	0.6000	1.2400	0.4800	4.0500
125.	05/082	03/088	0.9400	0.8000	0.9700	0.8000	0.2400	-2.5600	1.1900
126.	07/117	01/182	0.1200	0.0000	1.0100	0.0000	2.7600	1.0800	4.9500
127.	06/084	01/037	0.0200	0.8000	0.9900	0.8000	1.2600	0.4800	4.3300
128.	06/202	01/182	-1.0000	0.8000	0.9500	0.8000	1.0200	1.1880	3.7580
129.	03/005	01/184	-0.2400	0.6000	1.0500	0.6000	1.0600	1.0400	4.1100
130.	07/294	02/036	-1.5400	1.0000	1.0100	1.0000	0.8200	1.0800	3.3700
131.	05/023	04/371	0.4200	1.4000	1.0300	1.4000	0.8000	0.2000	5.2500
132.	06/338	02/038	-0.8000	1.0000	1.0100	1.0000	1.3800	0.8400	4.4300
133.	07/180	02/036	-2.2400	0.0000	0.9900	0.0000	2.3400	1.1600	2.2500
134.	05/328	01/179	-5.9800	1.0000	1.0300	1.0000	1.1600	-0.1600	-1.9500
135.	05/184	04/172	-0.7400	0.6000	0.9500	0.6000	1.5800	-0.9600	2.0300
136.	02/248	02/038	-0.3800	0.4000	0.9500	0.4000	1.5600	0.8000	3.73
137.	07/253	02/038	-0.0600	0.8000	0.9500	0.6000	0.9000	-0.4000	2.79
138.	06/255	02/036	-0.7200	1.4000	0.9700	1.2000	1.0800	0.0800	4.01
139.	05/256	03/051	-0.5600	1.0000	0.9700	1.0000	1.1800	0.7600	4.35
140.	04/271	04/172	-0.6200	1.0000	0.9700	1.0000	0.7400	0.4000	3.49
141.	03/272	02/038	-0.8400	0.8000	0.9900	0.6000	1.3400	0.8000	3.89
142.	08/166	01/410	0.8200	0.8000	1.0100	0.8000	1.1600	-0.2000	4.49
143.	06/196	03/246	-0.4600	0.2000	0.9700	0.2000	1.3000	1.1200	3.33
144.	08/098	05/160	1.3800	0.0000	0.9900	0.0000	0.4000	0.2000	2.97
145.	08/082	03/246	0.5000	0.4000	0.9700	0.4000	1.8400	0.4000	4.51
146.	05/085	02/160	1.0200	-0.2000	0.9700	-0.2000	1.5000	-3.8400	-0.75
147.	08/382	03/169	-0.0400	-0.2000	1.1300	-0.2000	2.5000	-1.1600	2.03
148.	07/340	05/249	-0.8400	-0.4000	1.1100	-0.4000	2.7000	1.0400	3.21
149.	06/371	05/083	0.1600	0.4000	0.9900	0.4000	1.1000	0.5200	3.57
150.	05/015	01/326	0.1400	0.6000	0.9900	-0.4000	2.0000	1.0000	4.33
151.	04/373	03/088	-0.5400	0.6000	1.0100	0.6000	1.1600	0.3200	3.13
152.	04/322	03/169	-1.2800	0.8000	1.0100	0.8000	1.0600	-0.8400	1.55
153.	08/375	03/088	-1.6000	0.4000	0.9700	0.2000	1.4600	0.7600	2.19
154.	04/247	05/249	-3.3600	0.4000	0.9900	0.4000	0.4800	1.0400	-0.05
155.	04/341	04/172	-1.1200	0.8000	1.0100	0.8000	0.6800	1.0000	3.17
156.	09/343	05/160	-0.7200	0.6000	1.0100	0.6000	1.0600	0.6800	3.23
157.	06/376	02/160	0.0200	0.6000	1.0100	0.6000	0.8000	-0.8800	2.15
158.	07/382	02/160	-0.5600	1.0000	0.9900	0.8000	0.7400	1.1600	4.13
159.	05/025	01/262	0.3200	0.6000	1.0100	0.6000	0.7400	0.3600	3.63
160.	05/030	01/381	0.5600	1.0000	1.0100	1.0000	1.1400	-0.4000	4.31
161.	05/063	01/381	-0.7200	0.0000	1.0500	0.0000	1.2000	1.1200	2.65
162.	10/069	05/249	-6.0200	0.8000	1.0100	0.8000	0.3200	0.0000	-2.49
163.	12/027	01/262	-0.9400	1.4000	0.9900	1.4000	0.6600	0.1600	3.67
164.	08/086	01/410	-0.1400	0.8000	0.9900	0.4000	0.8200	1.1200	3.99
165.	08/409	01/318	1.8400	0.0000	1.0100	0.0000	1.8400	1.0800	5.81
166.	08/023	01/381	0.6200	0.0000	1.0500	0.0000	2.0000	-0.2400	3.43
167.	06/200	01/182	-1.3400	0.4000	0.9700	0.4000	1.3200	-4.0400	-2.29
168.	06/022	01/410	0.2400	-0.4000	1.0100	-0.4000	1.2000	1.1600	2.61
169.	08/048	02/318	0.4800	0.4000	1.0300	0.0000	1.2800	0.8400	4.03
170.	08/008	02/321	-1.8400	1.0000	1.0100	1.0000	0.9000	0.4800	2.55
171.	08/061	02/015	-0.7800	1.2000	0.9900	1.2000	0.6000	1.0000	4.21
172.	08/067	02/015	0.4800	0.6000	1.0300	0.6000	1.1000	0.1600	3.97
173.	07/028	01/381	0.4600	0.8000	1.0100	0.8000	1.0000	1.0400	5.11
174.	07/044	01/326	-0.5800	0.6000	1.0300	0.6000	1.2800	-0.0800	2.85
175.	07/082	01/318	0.4400	0.4000	1.0100	0.4000	1.2000	0.8400	4.29
176.	06/008	01/262	-0.3000	0.4000	1.0700	0.4000	1.6000	-1.7600	1.41
177.	03/331	03/179	-0.4400	1.0000	1.0100	1.0000	1.2000	-1.1200	2.65
178.	06/185	01/037	-0.1000	0.4000	0.9700	0.4000	1.6000	0.2000	3.47
179.	07/160	01/182	0.8200	0.8000	1.0100	0.8000	1.8800	0.8400	6.15
180.	06/101	04/172	-0.1600	0.6000	1.0100	0.6000	1.6600	0.8000	4.51

Appendix 3(a) continues

Sl. No.	Dam no.	Sire no.	I_a=1+ (12-X_1) ±0.2	I_b=1+ (X_2-8) ±0.2	I_c=1+ (X_3-1.25) ±0.2	I_d=1+ (X_4-8) ±0.2	I_e=1+ (X_5-9) ±0.2	I_f=1+ (0.5-X_6) ±0.2	I=I_a+I_b +I_c+I_d +I_e+I_f
181.	05/174	03/006	0.9200	0.8000	1.0100	0.8000	1.1600	-0.2000	4.4900
182.	06/256	02/038	-0.5000	0.0000	0.9900	0.0000	1.2200	0.6800	2.3900
183.	08/349	02/314	0.6400	0.2000	1.0100	0.2000	1.4000	1.1880	4.6380
184.	06/327	01/262	0.6600	1.6000	0.9900	1.6000	0.4000	-1.6400	3.6100
185.	05/008	01/262	-0.4200	1.0000	1.0100	0.2000	1.8600	-0.1600	3.4900
186.	04/013	02/015	0.1400	1.2000	1.0100	0.8000	0.8200	0.6000	4.5700
187.	04/025	01/381	0.5000	0.4000	1.0100	0.4000	0.7200	0.8000	3.8300
188.	06/335	04/172	-1.0200	1.0000	0.9900	0.8000	0.3200	1.1200	3.2100
189.	07/166	01/410	-1.1400	0.8000	0.9900	0.8000	0.8200	-0.5200	1.7500
190.	04/323	02/318	0.6400	1.0000	0.9900	1.0000	0.6000	0.2400	4.4700
191.	04/324	01/262	1.1600	0.0000	1.0100	0.0000	1.1600	0.7600	4.0900
192.	05/387	02/318	0.7600	0.8000	0.9900	0.8000	0.4800	-2.1600	1.6700
193.	05/350	02/318	0.2000	0.6000	1.0100	0.6000	0.9400	-7.7600	-4.4100
194.	05/324	03/321	1.1600	1.0000	1.0100	0.6000	0.4200	0.7600	4.9500
195.	05/310	02/275	0.5400	1.0000	0.9700	1.0000	0.6000	-0.4800	3.8300
196.	06/301	02/209	1.2600	0.4000	0.9700	0.2000	0.8600	0.8080	4.4900
197.	06/321	01/262	-3.2600	0.0000	0.9500	0.0000	0.0000	-1.9200	-4.2300
198.	07/379	01/319	-0.3400	1.0000	0.9900	0.8000	1.1200	0.6480	4.2100
199.	07/350	02/209	0.4000	0.6000	1.0100	0.4000	1.2400	0.1600	3.8100
200.	07/325	03/231	0.9200	0.6000	1.0100	0.6000	0.9600	-9.7200	-5.6300
201.	08/303	02/175	0.3000	-0.2000	0.9700	-0.2000	1.9000	1.1200	3.8900
202.	08/343	03/321	1.3000	0.2000	1.0100	0.2000	1.1200	-2.3600	1.4700
203.	08/330	01/178	-2.1800	1.0000	0.9900	0.8000	0.8000	1.1600	2.5700
204.	10/328	02/319	-0.0800	1.0000	0.9900	0.6000	0.9600	0.8800	4.3500
205.	06/308	02/321	0.5800	1.4000	0.9900	0.2000	1.4600	1.1200	5.7500
206.	04/331	02/275	0.8400	0.6000	0.9900	0.2000	0.8800	1.1600	4.6700
207.	02/345	01/191	1.3000	0.6000	0.9900	0.6000	0.6400	0.5200	4.4500
208.	06/312	03/231	0.4200	1.2000	0.9900	1.2000	0.8000	-0.2400	4.3700
209.	07/303	03/231	0.3000	0.2000	0.9700	0.2000	1.5000	1.1200	4.2300
210.	03/262	02/209	0.6400	1.0000	0.9900	1.0000	0.5200	0.7600	4.9100
211.	03/264	02/275	-0.7400	0.6000	1.0100	0.6000	1.0600	0.8400	3.3700
212.	10/230	05/191	0.8200	0.6000	1.0100	0.6000	1.4000	1.1200	5.5500
213.	06/218	01/207	0.7400	0.4000	0.9700	0.4000	0.6800	1.1600	4.3500
214.	05/210	04/178	0.7200	1.2000	0.9900	0.6000	0.5000	0.0400	4.0500
215.	09/205	01/207	0.7800	0.8000	1.0300	0.8000	0.6600	0.4800	4.5500
216.	02/276	02/209	0.8200	0.8000	0.9700	0.6000	0.8000	1.1880	5.1780
217.	09/204	01/181	0.8200	1.2000	1.0100	1.2000	1.0000	0.8800	6.1100
218.	05/220	04/178	1.1200	0.6000	0.9900	0.4000	1.3200	0.4400	4.8700
219.	09/209	04/178	1.3400	0.4000	0.9900	0.4000	1.6800	-3.2400	3.5700
220.	06/229	01/232	1.2200	0.2000	0.9900	0.0000	1.1400	1.1200	4.6700
221.	10/189	04/178	0.5600	0.6000	0.9900	0.4000	1.3800	1.1200	5.1500
222.	09/160	04/157	1.0600	0.6000	1.1100	0.2000	1.8000	0.4000	5.1700
223.	10/160	04/157	0.8600	1.2000	1.1500	1.2000	0.9000	0.4400	5.7500
224.	10/149	01/091	0.5400	0.6000	1.1300	0.6000	1.3000	0.1200	4.2900
225.	05/145	01/100	0.4400	0.2000	1.1500	0.0000	0.5000	0.8400	3.1300
226.	04/179	01/091	0.8000	0.8000	1.0100	0.8000	0.6800	0.8800	4.970
227.	04/188	02/209	-0.0200	0.4000	0.9500	0.4000	0.6400	1.1600	3.530
228.	07/178	01/173	0.9200	0.6000	1.0100	0.6000	1.6600	0.0000	4.730
229.	03/174	02/103	0.4000	0.6000	1.0500	0.6000	1.2000	1.1600	5.010
230.	06/078	01/100	-0.5000	1.4000	1.1100	1.4000	1.4400	-0.7600	4.090
231.	04/080	02/103	1.6400	0.4000	1.0500	0.4000	1.2600	1.0400	5.790
232.	06/081	02/103	0.1600	1.4000	0.9900	1.2000	0.7200	0.8000	5.270
233.	08/093	08/265	0.7000	1.0000	1.1100	1.0000	1.1200	-0.8800	4.130
234.	09/130	02/103	0.4000	1.2000	1.0500	1.2000	0.7600	0.1200	4.730
235.	09/267	11/002	0.3800	1.4000	1.0300	0.6000	1.2400	-1.2000	3.450
236.	11/181	01/091	-0.2400	1.2000	0.8900	1.2000	0.3000	1.1200	4.570
237.	12/181	01/091	0.9600	1.0000	1.0100	0.6000	1.0400	-0.7200	3.890
238.	08/180	01/181	0.8000	0.8000	1.0100	0.8000	1.2200	1.0800	5.710
239.	07/218	01/091	1.3600	1.2000	0.9700	1.2000	0.9400	0.8800	6.550
240.	08/158	01/181	-0.1800	0.6000	1.0100	0.6000	1.2600	-0.9200	2.370
241.	06/175	01/178	0.3800	0.2000	1.0100	0.2000	1.2800	0.8000	3.870
242.	06/205	01/091	0.4800	1.4000	1.1300	1.4000	0.6200	0.6800	5.710
243.	09/321	02/275	1.1400	1.0000	0.9900	1.0000	0.7200	0.8800	5.730
244.	10/057	01/059	0.8200	0.8000	1.0100	0.6000	0.7000	1.1600	5.090
245.	06/047	02/051	0.5200	0.8000	1.0100	0.6000	0.5600	1.1600	4.650
246.	10/047	01/059	0.4600	0.6000	1.0500	0.6000	1.5600	1.1600	5.430
247.	05/047	02/051	0.5000	1.6000	0.9900	1.6000	1.3600	1.1200	7.170
248.	04/032	008620	0.2000	0.8000	1.1100	0.6000	1.0600	-0.8800	2.890
249.	02/012	008620	0.5000	1.0000	1.0900	0.2000	0.9000	-1.4400	-0.750
250.	03/016	02/017	0.3400	1.0000	1.0100	1.0000	1.0200	-1.7200	2.650
251.	10/017	03/027	0.3000	0.4000	1.0500	0.8000	0.7600	-0.4000	3.310
252.	09/019	008620	0.6000	0.8000	1.0900	0.8000	1.0400	1.1200	5.450
253.	03/020	08/265	0.8400	1.0000	1.0300	1.0000	1.0800	1.0400	5.990
254.	02/004	01/255	0.7800	1.2000	0.9700	-0.2000	1.3600	1.0800	5.190
255.	08/005	01/265	0.7600	0.4000	1.0300	-0.2000	0.7000	-0.5600	2.130

I_1=Age at farrowing I_2=Litter size at birth I_3=Average weight of a piglet at birth I_4=Litter size at weaning I_5=Average weight of a piglet at weaning I_6=Post weaning conception period

Appendix 3(b)

Composite sow index ($I=I_a+I_b+I_c+I_d+I_e+I_f$) of pigs in the second parity

Sl. No.	Dam no.	Sire no.	$I_a=1+(18-I_1)*0.2$	$I_b=1+(I_2-8)*0.2$	$I_c=1+(I_3-1.25)*0.2$	$I_d=1+(I_4-8)*0.2$	$I_e=1+(I_5-9)*0.2$	$I_f=1+(0.5-I_6)*0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$	Sl. No.	Dam no.	Sire no.	$I_a=1+(18-I_1)*0.2$	$I_b=1+(I_2-8)*0.2$	$I_c=1+(I_3-1.25)*0.2$	$I_d=1+(I_4-8)*0.2$	$I_e=1+(I_5-9)*0.2$	$I_f=1+(0.5-I_6)*0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$
1.	04/196	02/036	-3.1600	1.0000	1.0500	1.0000	0.9600	-4.2000	-3.3500	46.	08/280	01/138	0.2200	1.2000	1.0300	1.0000	1.2000	0.6000	5.2500
2.	07/199	02/036	-1.4600	1.2000	1.0100	1.2000	0.4000	-0.2800	2.0700	47.	07/287	02/137	-0.1000	0.8000	1.0100	0.6000	0.6200	0.9600	3.8900
3.	08/256	01/054	-1.4600	0.8000	1.0300	0.8000	1.0400	1.1200	3.3300	48.	06/288	01/138	-0.2000	0.4000	1.0100	0.2600	1.1200	0.1200	2.6500
4.	03/268	01/184	-1.4400	1.0000	1.0500	0.6000	1.4400	0.8400	3.4900	49.	04/291	03/392	-0.9600	0.4000	1.0300	0.4000	0.8800	1.0400	2.7900
5.	04/287	01/184	-2.4200	1.0000	1.0500	0.8000	0.8000	-1.1600	0.0700	50.	06/294	03/392	-0.6000	1.2000	1.0100	1.0000	0.6800	1.1200	4.4100
6.	04/295	04/051	-2.2600	1.0000	1.0500	0.4000	1.6000	1.0400	2.8300	51.	07/295	04/371	-0.4400	1.6000	1.0300	0.8000	0.8400	1.1200	4.9500
7.	06/298	02/036	0.0400	1.2000	1.0100	1.2000	0.9200	1.1200	5.4900	52.	07/306	04/371	-0.4000	0.6800	1.0100	0.6000	1.1200	1.1200	4.0500
8.	06/333	01/280	-2.5400	0.6000	1.0500	0.2000	1.0600	1.0000	1.3700	53.	08/310	03/392	-0.3400	1.4000	1.0300	1.0000	0.9200	0.4800	4.4700
9.	05/341	02/036	-0.4200	1.2000	1.0300	1.2000	0.5000	1.0800	4.5900	54.	07/319	01/184	-0.4000	1.2000	1.0100	1.2000	0.6800	0.8000	4.4300
10.	03/353	03/031	-0.8600	1.2000	1.0500	0.8000	0.5800	-0.0400	2.7300	55.	03/335	01/138	0.2400	1.0000	1.0100	0.4000	1.4000	0.8400	4.8900
11.	06/023	01/054	-0.2800	1.2000	1.0500	1.2000	0.4000	1.1800	4.7300	56.	08/360	01/138	0.5800	0.4000	1.0300	0.4000	1.3800	0.6400	4.4300
12.	08/023	02/141	-0.8600	1.0000	1.0500	0.6000	1.7400	-5.3600	-1.8300	57.	10/367	03/011	0.3800	1.4000	1.0100	1.2000	0.4000	0.7200	5.1100
13.	04/027	02/036	-0.2600	1.0000	1.0500	0.4000	1.8400	0.2800	4.2900	58.	09/371	04/371	0.5800	0.8000	1.0300	0.8000	1.0400	0.5200	4.7700
14.	04/040	03/392	-0.2400	1.4000	1.0500	1.4000	1.0000	0.6800	5.2900	59.	06/187	04/051	-2.3400	1.2000	1.0300	1.2000	0.6800	0.8400	2.6100
15.	08/041	01/054	-1.1000	1.0000	1.0300	0.6000	0.8200	1.0000	3.3500	60.	07/188	04/172	-1.2000	0.6000	1.1500	0.6000	1.1000	1.1600	3.4100
16.	04/042	04/051	-0.4400	1.2000	1.0500	0.6000	1.4600	-6.1200	-2.2500	61.	02/191	01/037	-1.6200	1.2000	1.0100	0.8000	1.0800	0.5600	3.0300
17.	06/137	02/036	-0.8400	1.6000	1.0100	1.6000	1.2000	0.6800	5.2500	62.	06/331	03/179	0.3400	1.0000	1.0300	1.0000	0.9800	0.8400	5.1920
18.	08/137	01/138	-0.9000	1.2000	1.0300	1.2000	1.0800	-3.9600	-0.3500	63.	06/253	04/172	-0.6400	1.2000	0.9700	1.2000	0.9400	1.0000	4.6700
19.	05/139	03/031	-1.1200	1.2000	1.0300	1.2000	1.2400	0.6400	4.1900	64.	06/256	01/182	-0.6600	0.8000	1.0300	0.8000	1.1800	1.1160	4.3380
20.	06/140	04/371	0.6600	1.2000	1.0500	1.0000	0.7400	-5.0800	-0.4300	65.	07/177	01/037	-1.7800	0.6000	1.0100	0.6000	1.3600	0.8000	2.5900
21.	04/141	04/371	1.1000	0.6000	1.0300	0.4000	1.2600	0.8800	5.2700	66.	07/009	04/051	-0.9400	1.4000	0.9500	1.4000	1.3000	1.0800	5.1900
22.	05/143	02/137	1.2800	1.4000	1.0300	0.8000	0.6800	-0.6000	4.5900	67.	03/374	01/410	-1.8800	0.0000	0.9700	0.0000	1.0600	0.7600	0.9100
23.	06/143	02/137	-0.4800	1.2000	1.0100	1.2000	0.9000	0.5600	4.3900	68.	04/201	01/084	-1.2600	0.8000	1.0100	0.8000	1.8000	0.2400	3.3900
24.	04/144	03/392	-1.8600	1.0000	1.0100	0.2000	0.6000	0.8400	1.7900	69.	06/047	01/410	-1.1400	0.6000	1.0500	0.6000	1.0000	0.8400	2.9500
25.	05/144	02/036	-1.3200	0.0000	1.0300	-0.2000	1.5000	0.8000	1.8100	70.	07/217	02/038	-1.5400	1.6000	1.0300	1.4400	0.7800	0.4800	3.7500
26.	09/150	04/371	-0.1000	1.6000	1.0300	1.6000	0.6000	0.4000	5.1300	71.	07/189	04/051	-1.4600	0.4000	1.0300	0.4000	1.3200	-0.9200	0.7700
27.	06/153	01/138	-0.8200	1.2000	1.0300	1.0000	0.9200	-0.4800	2.8500	72.	03/191	02/038	-1.7000	0.2000	1.0300	0.2000	1.9800	0.9200	2.6300
28.	09/153	02/137	-0.2200	1.2000	1.0300	0.6000	1.0800	0.8000	4.4900	73.	07/082	04/172	0.4200	0.8000	0.9500	0.8000	1.2200	0.9200	5.1100
29.	04/155	01/138	-3.0600	0.8000	0.9900	0.8000	1.1800	1.0400	1.7500	74.	08/072	01/037	-1.5400	1.4000	0.9500	1.0000	1.2000	1.0000	4.0100
30.	05/162	04/371	-0.0400	0.4000	1.0300	0.4000	1.1200	0.8400	3.7500	75.	06/090	03/081	-0.1400	0.0000	0.9500	0.0000	1.2600	1.0800	3.1500
31.	05/164	01/140	-0.1400	0.6000	1.0300	0.6000	1.5200	1.1600	4.7700	76.	06/084	03/088	-0.2400	1.0000	0.9700	0.8000	1.1000	1.1880	4.8180
32.	07/166	03/392	-0.7400	-0.2000	1.0500	-0.2000	2.2400	-1.6800	0.4700	77.	07/296	02/036	-0.9000	0.0000	1.0500	0.0000	1.3000	0.9600	2.4100
33.	08/174	03/392	-1.3400	1.6000	1.0300	1.2000	0.7600	1.0000	4.2500	78.	07/180	02/036	-2.1600	0.6000	1.0100	0.6000	1.2600	-0.3600	0.9500
34.	07/175	02/036	-0.1800	1.2000	1.0300	1.2000	1.4000	-0.5200	4.1300	79.	02/248	01/053	-0.5200	1.2000	1.0100	1.2000	1.2400	1.0400	5.1700
35.	07/177	02/137	-0.5400	0.6000	1.0300	0.6000	1.2400	0.2400	3.1700	80.	06/255	03/265	-1.2000	1.4000	1.0300	1.2000	0.5600	0.9200	3.9100
36.	08/198	02/036	-0.1400	1.4000	1.0300	1.2000	0.5600	1.0800	5.1300	81.	04/271	02/036	-0.9400	1.4000	1.0100	1.4000	0.6600	1.1200	4.6500
37.	06/200	02/143	0.2600	1.2000	1.0300	1.2000	0.9000	0.2800	4.8700	82.	03/272	02/036	-0.9800	0.8000	1.0500	0.8000	0.6600	1.0800	3.4100
38.	07/209	03/392	-0.3800	1.8000	1.0300	1.4000	0.8400	0.5600	5.2500	83.	08/098	03/246	0.9800	0.4000	1.0100	0.2000	1.7000	1.0000	5.2900
39.	05/210	01/140	-0.1000	0.6000	1.0300	0.6000	1.2200	1.0400	4.3900	84.	09/082	01/182	0.2000	0.8000	0.9500	0.8000	1.1800	-0.9600	2.9700
40.	09/211	01/054	-0.5000	0.8000	1.0100	0.0000	0.8800	0.8000	2.9900	85.	07/340	01/182	-0.8600	0.6000	0.9700	0.6000	0.9000	0.9600	3.1700
41.	04/212	04/371	0.0000	1.0000	1.0100	0.8000	1.1800	-4.5200	-0.5300	86.	06/371	02/160	-0.1000	-0.2000	0.9700	-0.2000	0.9400	1.1200	2.5300
42.	10/233	04/371	0.0200	1.2000	1.0300	1.0000	1.1800	0.5600	4.9900	87.	05/015	01/319	0.0800	0.4000	1.0300	0.4000	1.0200	1.1200	4.0500
43.	09/237	01/138	-0.1400	1.4000	1.0300	1.4000	0.8600	-2.4400	2.1100	88.	08/375	04/172	-1.7800	0.2000	0.9700	0.0000	1.8000	0.7200	1.9100
44.	06/252	03/392	-1.2400	0.6000	1.0500	0.2000	1.4200	0.5200	2.5500	89.	08/067	03/088	0.0400	1.0000	1.0100	0.2000	1.2600	1.0400	4.5500
45.	07/271	01/138	-0.0600	1.0000	1.0300	0.2000	1.1400	0.9600	4.2700	90.	07/028	01/262	0.4200	1.0000	0.9900	1.0000	0.6800	-1.0000	3.0100

Appendix 3(b) continues

Sl. No.	Dam no.	Sire no.	I_a=1+ (18-I_1) ±0.2	I_b=1+ (I_2-8) ±0.2	I_c=1+ (I_3-1.25) ±0.2	I_d=1+ (I_4-8) ±0.2	I_e=1+ (I_5-9) ±0.2	I_f=1+ (0.5-I_6) ±0.2	I=I_a+I_b +I_c+I_d +I_e+I_f	Sl. No.	Dam no.	Sire no.	I_a=1+ (18-I_1) ±0.2	I_b=1+ (I_2-8) ±0.2	I_c=1+ (I_3-1.25) ±0.2	I_d=1+ (I_4-8) ±0.2	I_e=1+ (I_5-9) ±0.2	I_f=1+ (0.5-I_6) ±0.2	I=I_a+I_b +I_c+I_d +I_e+I_f
91.	03/331	03/392	-1.4600	1.4000	1.0500	1.4000	0.5000	0.7600	3.6500	109.	04/331	05/191	0.9000	0.4000	0.9900	0.4000	0.8000	-2.0000	1.4900
92.	06/185	02/038	-0.5000	0.8000	0.9700	0.4000	1.4800	1.1600	4.3100	110.	02/345	04/321	1.0200	0.8000	0.9900	0.8000	1.6000	1.1200	6.3300
93.	07/160	01/182	0.7200	1.2000	0.9500	1.0000	1.6200	1.0000	6.4900	111.	07/285	02/314	0.5800	1.4000	0.9900	1.4000	0.8000	-0.2400	4.9300
94.	08/166	03/246	0.3200	-0.2000	0.9700	-0.2000	3.0000	1.1200	5.0100	112.	07/254	03/321	0.8600	0.6000	0.9900	0.0000	1.2600	1.0800	4.7900
95.	06/146	04/371	-0.6600	0.8000	1.0300	-0.8000	1.1800	1.1880	4.3380	113.	04/215	01/191	1.4200	0.2000	0.9900	-0.2000	1.0000	-2.0800	1.7300
96.	04/013	01/381	-0.0800	1.0000	1.0100	0.6000	0.6000	-0.2000	2.9300	114.	03/262	03/313	0.4400	0.2000	1.0100	0.2000	1.3800	0.8400	4.1100
97.	04/324	02/231	1.0000	0.4000	1.0100	0.4000	1.2200	-1.1200	2.9100	115.	09/209	01/178	-0.7200	0.8000	1.0100	0.8000	0.9400	1.0000	3.8300
98.	05/387	02/321	-0.8400	0.8000	0.9900	0.8000	0.8400	-2.0800	0.4700	116.	09/255	02/314	0.3000	0.6000	1.0100	0.6000	1.1200	-0.5600	3.0700
99.	05/324	03/231	1.0000	-0.2000	1.0300	-0.2000	1.7000	1.0400	4.3700	117.	10/160	04/157	0.5600	1.2000	1.0100	1.2000	1.0000	0.7600	5.7300
100.	05/310	01/262	-0.1400	0.8000	1.0100	0.8000	0.9000	-1.0400	2.3300	118.	06/179	02/209	0.6800	0.4000	0.9900	0.4000	0.9000	0.8800	4.2500
101.	06/301	03/313	1.2200	0.2000	1.0100	0.2000	1.3800	0.6000	4.6100	119.	03/174	01/091	0.4800	0.4000	0.9900	0.4000	0.8400	1.1200	4.2300
102.	06/321	03/313	-0.3600	1.4000	0.9900	1.0000	0.6200	-5.2000	-1.5500	120.	05/183	01/091	1.2000	1.4000	0.9900	0.4000	1.4000	0.9600	6.3500
103.	07/342	02/209	1.3200	0.8000	0.9900	0.8000	0.8000	-1.6800	3.0300	121.	06/080	01/091	1.6200	1.0000	0.9900	1.0000	1.0200	-1.9600	3.6700
104.	08/330	05/083	-2.2000	0.8000	1.0100	0.8000	0.9000	-1.1200	0.1900	122.	08/110	01/091	0.8200	1.4000	0.9700	1.2000	0.5200	1.1200	6.0300
105.	10/334	01/262	0.4800	1.4000	0.9700	1.2000	0.8000	-0.7200	4.1300	123.	07/167	01/178	1.1400	0.4000	0.9900	0.4000	1.5200	0.4800	4.9300
106.	10/328	01/262	-2.1200	0.4000	1.0100	0.4000	1.5600	1.0800	2.3300	124.	05/231	01/191	-0.7600	0.0000	1.0100	0.0000	2.2000	1.1200	3.5700
107.	05/242	01/191	3.0400	1.0000	0.9900	1.0000	0.9800	0.8400	7.8500	125.	03/004	08/265	0.9400	1.0000	0.9900	0.8000	0.5600	1.1200	5.4100
108.	04/334	02/275	1.8000	0.4000	1.0100	0.4000	1.4800	0.9200	6.0100	126.	02/004	08/002	0.8200	1.6000	0.9900	0.8000	0.5600	1.1600	5.9500

I_1=Age at farrowing I_2=Litter size at birth I_3=Average weight of a piglet at birth I_4=Litter size at weaning I_5=Average weight of a piglet at weaning I_6 =Post weaning conception period

Appendix 3(c)

Composite sow index ($I=I_a+I_b+I_c+I_d+I_e+I_f$) of pigs in the third parity

Sl. No.	Dam no.	Sire no.	$I_a=1+(24-X_1)\times0.2$	$I_b=1+(X_2-8)\times0.2$	$I_c=1+(X_3-1.25)\times0.2$	$I_d=1+(X_4-8)\times0.2$	$I_e=1+(X_5-9)\times0.2$	$I_f=1+(0.5-X_6)\times0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$
1.	07/253	01/184	-0.8800	0.8000	1.0500	0.6000	0.8200	0.4800	2.8700
2.	07/188	01/184	-1.1600	1.2000	1.1500	1.0000	0.8800	0.6400	3.7100
3.	03/331	03/392	-0.8600	1.4000	1.0500	1.4000	0.5000	0.7600	4.2500
4.	07/160	01/182	0.6800	0.8000	0.9500	0.8000	1.1800	1.1200	5.5300
5.	06/084	01/037	-0.1800	1.0000	0.9500	1.0000	1.0600	0.9600	4.7900
6.	07/180	02/038	-2.1600	0.6000	1.0500	0.4000	1.5200	1.1600	2.5700
7.	05/184	01/280	-2.1600	1.0000	1.0300	0.8000	1.0100	1.0400	2.7900
8.	02/248	04/371	-0.5200	1.0000	1.0300	1.0000	1.1600	-0.6800	2.9900
9.	06/153	01/138	-0.8800	0.8000	1.0500	0.6000	0.8200	0.4800	2.8700
10.	06/255	01/184	-1.2600	1.0000	1.0500	0.6000	0.5000	1.0400	2.9300
11.	05/256	01/184	-0.9800	-0.4000	1.0700	-0.4000	2.0000	0.4000	1.6900
12.	04/271	01/054	-0.9200	0.6000	1.0500	0.6000	1.4000	0.8000	3.5300
13.	03/272	01/037	-0.9600	1.6000	1.0300	1.2000	0.8000	0.5600	4.2300
14.	08/166	04/172	0.6400	1.0000	0.9500	0.8000	1.2600	-0.8400	3.8100
15.	08/098	03/246	0.9600	0.8000	0.9500	0.8000	1.6800	1.0800	6.2700
16.	03/191	02/038	-1.6000	1.0000	1.0300	0.4000	0.5600	0.6400	2.0300
17.	07/082	01/037	0.3600	1.0000	0.9500	1.0000	1.6800	0.8000	5.7900
18.	08/072	02/038	-1.5400	1.4000	0.9700	1.0000	0.6400	1.1600	3.6300
19.	06/185	01/037	-0.2000	1.2000	1.0100	0.8000	1.2800	-1.6400	2.4500
20.	09/371	01/140	0.6800	0.8000	0.9500	0.8000	1.1800	1.1200	5.5300
21.	06/256	02/038	-0.5600	1.0000	1.0500	1.0000	0.5200	1.0800	4.0900
22.	04/136	01/184	-3.3600	1.0000	1.0500	0.6000	1.3200	1.1600	1.7700
23.	07/199	02/038	-2.0600	1.4000	1.0500	1.4000	0.5800	-3.4400	-1.0700
24.	08/256	03/392	-1.4200	2.0000	1.0300	1.2000	0.2400	-2.0800	0.9700
25.	03/268	02/036	-1.5200	1.0000	1.0500	1.0000	1.0200	1.0800	3.6300
26.	04/287	03/392	-3.4800	1.0000	1.0300	1.0000	0.6800	-0.5200	-0.2900
27.	04/295	01/280	-2.2600	0.4000	1.0500	0.2000	0.6200	1.0800	1.0900
28.	06/298	03/392	0.1000	1.2000	1.0300	0.8000	0.8600	0.7200	4.6900
29.	06/333	01/054	-2.5600	1.4000	1.0100	1.2000	1.1400	-0.1200	2.0700
30.	05/361	02/036	-0.3800	1.2000	1.0500	1.2000	0.6400	-3.3200	0.3900
31.	03/353	01/054	-1.4000	0.8000	1.0300	0.6000	0.9800	0.9600	2.9700
32.	06/023	01/054	-0.2200	0.0000	1.0500	0.0000	1.2600	0.7600	2.8500
33.	08/023	02/036	-1.6600	1.6000	1.0100	1.4000	0.7200	-1.6400	1.4300
34.	04/040	02/137	0.1000	0.0000	1.0500	-0.2000	1.5400	-2.5600	-0.0700
35.	08/041	02/036	-1.0600	0.4000	1.0300	0.4000	1.5400	1.1600	3.4700
36.	06/137	02/036	-0.9600	0.8000	1.0300	0.4000	0.9200	-0.1200	2.0700
37.	08/137	02/036	-1.0000	1.6000	1.0100	1.2000	1.4000	-0.2000	4.0100
38.	04/141	01/138	1.0000	0.2000	1.0500	0.0000	0.8000	-0.4800	2.5700
39.	05/143	01/184	1.0600	0.8000	1.0100	0.8000	0.8400	1.0400	5.5500
40.	06/143	03/031	-0.7000	1.4000	1.0100	1.4000	0.6800	0.8600	4.6700
41.	09/150	04/371	-0.4200	1.4000	1.0100	1.0000	0.9200	0.5200	4.4300
42.	09/153	02/137	-0.3200	1.0000	1.0300	0.4000	1.9600	0.8000	4.8700
43.	05/162	03/392	-0.1200	0.4000	1.0300	0.4000	1.4400	0.0400	3.1900
44.	05/164	01/140	-0.1200	1.0000	1.0300	0.2000	1.7600	0.0400	3.9100
45.	08/174	03/392	-1.3400	1.2000	0.9900	1.2000	0.8000	0.7200	3.5700
46.	07/175	04/371	-0.8600	1.6000	1.0300	1.2000	0.9400	1.0400	4.9500
47.	07/177	02/137	-0.9000	1.0000	1.0300	1.0000	0.6400	0.8400	3.6100
48.	08/198	02/036	-0.1200	1.4000	1.0100	1.4000	1.0600	1.1200	5.8700
49.	06/200	06/018	-0.1000	0.6000	1.0100	0.6000	1.2400	1.0800	4.4300
50.	07/209	03/392	-0.6200	0.8000	1.0100	0.8000	0.7600	0.9200	3.6700
51.	05/210	01/138	-0.0800	0.6000	1.0300	0.4000	1.0800	0.7200	3.5500
52.	04/212	03/006	-0.3400	1.4000	1.0300	0.6000	0.5800	-0.3600	3.3100
53.	10/233	02/036	-0.2200	0.8000	0.9900	0.2000	1.1000	0.7600	3.6300
54.	07/271	01/140	-0.1400	1.0000	1.0100	0.8000	1.1800	0.4800	4.3300
55.	05/308	01/318	1.3000	0.4000	1.0500	0.4000	1.6000	1.0800	5.8300
56.	04/323	01/317	0.5400	1.0000	0.9900	0.8000	1.0000	1.0400	5.3700
57.	05/324	01/319	1.0800	1.0000	0.9900	1.0000	0.8000	-0.3200	4.5500
58.	06/301	01/318	-0.9600	0.2000	1.0500	0.2000	1.7800	1.1600	3.4300
59.	06/321	01/326	3.5400	0.4000	0.9900	-0.2000	0.9000	-2.6800	2.9500
60.	08/303	01/317	0.4400	1.2000	0.9900	1.2000	0.2400	0.6000	4.6100
61.	08/343	01/262	-0.3800	1.4000	0.9900	1.0000	0.8000	-0.0400	3.7100
62.	10/324	01/322	-0.1200	0.4000	0.9900	0.4000	0.8000	-0.3200	2.1500
63.	07/254	02/314	0.9600	1.0000	0.9900	1.0000	1.0600	1.1200	6.1300
64.	04/215	02/314	-0.1600	0.8000	0.9900	0.8000	0.8000	0.6800	3.9100
65.	09/218	01/191	0.4200	0.2000	0.9900	0.2000	1.3200	1.1200	4.2500
66.	03/209	02/231	-0.7000	-0.2000	1.0300	-0.2000	1.8000	0.4400	2.1700
67.	09/255	01/317	-0.5000	1.2000	0.9900	0.6000	0.5200	-3.8800	-0.9700
68.	07/261	01/262	0.9200	0.6000	1.0100	0.6000	1.2600	0.8800	5.2700
69.	07/218	02/209	0.9800	1.8000	0.9700	1.8000	0.7600	-1.8800	4.4300
70.	11/265	08/002	0.2100	1.4000	1.0500	0.6000	1.3200	1.0400	5.6100
71.	09/126	03/159	0.2200	1.2000	1.0100	0.2000	1.8000	1.1200	5.5500

X_1=Age at farrowing X_2=Litter size at birth X_3=Average weight of a piglet at birth X_4=Litter size at weaning X_5=Average weight of a piglet at weaning X_6=Post weaning conception period

Appendix 3(d)

Composite sow index ($I=I_a+I_b+I_c+I_d+I_e+I_f$) of pigs in the fourth parity

Sl. No.	Dam no.	Sire no.	$I_a=1*(30-I_1)*0.2$	$I_b=1*(I_2-8)*0.2$	$I_c=1*(I_3-1.25)*0.2$	$I_d=1*(I_4-8)*0.2$	$I_e=1*(I_5-9)*0.2$	$I_f=1*(0.5-I_6)*0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$	Sl. No.	Dam no.	Sire no.	$I_a=1*(30-I_1)*0.2$	$I_b=1*(I_2-8)*0.2$	$I_c=1*(I_3-1.25)*0.2$	$I_d=1*(I_4-8)*0.2$	$I_e=1*(I_5-9)*0.2$	$I_f=1*(0.5-I_6)*0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$
1.	04/196	01/054	-3.3400	0.2000	1.0500	0.2000	1.1000	1.1200	0.3300	14.	06/143	01/038	-0.7600	1.2000	0.9700	0.8000	0.8600	1.1200	4.1900
2.	08/256	01/184	-2.9400	2.0000	1.0300	1.2000	0.2400	-4.9200	-3.3900	15.	05/162	06/018	-0.6000	1.0000	0.9900	1.0000	1.0200	1.1600	4.5700
3.	03/268	02/137	-1.4800	1.0000	1.0500	0.6000	0.7400	0.6000	2.5100	16.	06/200	06/018	-0.0600	1.0000	1.0100	1.0000	0.5200	1.1200	4.5900
4.	04/287	01/184	-4.2800	1.2000	1.0100	1.2000	0.6000	0.4400	0.1700	17.	05/184	03/312	-0.7200	-0.2000	1.0500	-0.2000	2.3000	1.0800	3.3100
5.	04/295	02/036	-2.2400	0.6000	1.0500	0.6000	2.0600	1.0400	3.1100	18.	08/072	04/017	-1.5200	1.6000	1.0300	1.4000	0.3600	1.0400	3.9100
6.	06/298	03/392	-0.0400	1.4000	1.0300	0.4000	0.4400	0.6400	3.8700	19.	07/160	01/037	0.7200	0.8000	1.0100	0.2000	1.2000	1.0800	5.0100
7.	06/333	03/392	-3.1200	1.2000	1.0300	1.2000	0.6200	-0.8800	0.0500	20.	05/308	02/314	1.3000	1.2000	0.9900	1.0000	1.0800	1.0800	6.6500
8.	05/341	01/280	-0.3400	1.0000	1.0500	1.0000	0.4200	-3.9600	-0.8300	21.	04/324	01/381	0.2400	1.0000	1.0100	0.6000	1.8600	1.0400	5.7500
9.	03/353	04/051	-1.4200	1.0000	1.0300	0.8000	1.3600	0.8000	3.5700	22.	05/326	01/262	0.3100	1.4000	0.9900	0.4000	0.6000	0.8000	4.5700
10.	06/023	02/036	-0.3200	0.6000	1.0500	0.6000	1.5800	-0.2400	3.2700	23.	10/328	03/088	-0.7800	1.0000	1.0100	0.6000	0.8000	1.0800	3.7100
11.	04/060	02/143	-1.6400	0.6000	1.0300	0.2000	1.9400	0.7600	2.8900	24.	02/345	01/262	1.0400	0.4000	1.0100	0.4000	0.5400	0.7600	4.1500
12.	04/141	01/138	0.2600	0.6000	1.0300	0.6000	1.1000	1.1200	4.7100	25.	09/255	01/410	-0.6000	1.4000	1.0100	0.8000	0.5000	-2.7200	0.3900
13.	05/141	03/392	0.3000	0.4000	1.0100	0.0000	1.4000	0.8000	3.9100										

I_1 = Age at farrowing I_2=Litter size at birth I_3=Average weight of a piglet at birth I_4=Litter size at weaning I_5=Average weight of a piglet at weaning I_6=Post weaning conception period

Appendix 3(e)

Composite sow index ($I=I_a+I_b+I_c+I_d+I_e+I_f$) of pigs in the fifth parity

Sl. No.	Dam no.	Sire no.	$I_a=1*(30-I_1)*0.2$	$I_b=1*(I_2-8)*0.2$	$I_c=1*(I_3-1.25)*0.2$	$I_d=1*(I_4-8)*0.2$	$I_e=1*(I_5-9)*0.2$	$I_f=1*(0.5-I_6)*0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$	Sl. No.	Dam no.	Sire no.	$I_a=1*(30-I_1)*0.2$	$I_b=1*(I_2-8)*0.2$	$I_c=1*(I_3-1.25)*0.2$	$I_d=1*(I_4-8)*0.2$	$I_e=1*(I_5-9)*0.2$	$I_f=1*(0.5-I_6)*0.2$	$I=I_a+I_b+I_c+I_d+I_e+I_f$
1.	08/256	02/036	-3.2000	1.2000	1.0100	0.8000	0.8600	0.9200	1.5900	5.	06/023	03/392	-1.0200	1.4000	0.9900	0.8000	1.1800	0.9600	4.3100
2.	03/268	02/143	-1.6400	1.0000	1.0300	1.0000	1.2600	1.1600	3.8100	6.	08/072	01/037	-1.5000	1.6000	1.0300	1.6000	0.4400	0.8800	4.0500
3.	04/295	02/036	-2.2600	0.8000	1.0300	0.6000	0.7800	1.1600	2.1100	7.	07/160	02/038	0.7400	0.6000	1.0500	0.6000	1.3000	-0.1600	4.1300
4.	06/298	02/143	-0.2000	1.4000	1.0300	1.0000	0.6200	-0.4800	3.3700	8.	05/326	01/144	0.2200	0.8000	1.0100	0.8000	0.7400	1.1200	4.6900

I_1 = Age at farrowing I_2=Litter size at birth I_3=Average weight of a piglet at birth I_4=Litter size at weaning I_5=Average weight of a piglet at weaning I_6=Post weaning conception period

CONSTRUCTION OF A COMPOSITE SOW INDEX AND STUDY OF ITS EFFECTS DUE TO SIRE, PARITY AND SEASON IN PIGS

By
CINI VARGHESE

ABSTRACT OF THE THESIS

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ABSTRACT

An investigation was done for the construction of a composite sow index based on the data collected from sow cards of pigs maintained at the University Pig Breeding Farm, Mannuthy, with the additional objectives of studying the effect of sire, parity and season on this index and also to suggest for culling the uneconomic animals based on this index.

Data were collected from 255 pigs selected under the first parity for the characters age at farrowing, post weaning conception period, litter size at birth, average weight of a piglet at birth, litter size at weaning and average weight of a piglet at weaning. The data were collected for the subsequent parities also for the above mentioned characters from among the 255 sows selected.

Three different types of selection indices were worked out viz. phenotypic index based on one main character and one auxiliary character, phenotypic index based on one main character and two auxiliary characters, and a composite sow index. While comparing the phenotypic indices, it was found that the indices based on the characters litter size at weaning and average weight of a piglet at weaning were the most contributing characters along with age at farrowing and post weaning conception period. The variances of the three types of indices were compared and it was found that the variances of the composite sow index was less than that of the other two indices for all the five parities. Hence the composite sow index was selected as the most efficient index . Therefore, the best 25 animals were sorted out for each parity based on the composite sow index and used for further analysis.

The best sow-sire pairs under each parity were identified by comparing the ranks of the three types of indices coming within the first 25.

The seasonal effect on various characters considered was also tested by classifying the best ranking 25 sow-sire pairs into three seasons namely, winter season, summer season and rainy season under each parity. The average index under each season was compared by using the analysis of variance and it was found that there is no seasonal influence on any of the six contributing characters.

The sows repeatedly coming under most of the parities were sorted out from the best 25 sows selected based on the composite sow index. The average values for the index and also for all the contributing characters under different parities were compared with the normal values of a standard sow and 07/160 was selected as the best sow. Similarly, 01/182 was selected as the best sire and 07/160-01/182 was chosen as the best sow-sire pair.

An attempt was done to find out the best parity also. For this, the sows came under at least for the first three parities were sorted out and their mean index values were compared using the analysis of variance test. No significant difference was observed for any of the parities.

Being the most efficient index, the standard value for the composite sow index should be around six. Hence it can be concluded that the sows showing an index value less than 6 can be culled and nearer or greater than 6 can be retained for further breeding.