

# CHLORAL HYDRATE FOR GENERAL ANAESTHESIA IN GOATS

BY

**R. VISWANATHAN**

## **THESIS**

Submitted in partial fulfilment  
of the requirement for the degree

## **MASTER OF VETERINARY SCIENCE**

Faculty of Veterinary and Animal Sciences

Kerala Agricultural University

Department Of Surgery

COLLEGE OF VETERINARY AND ANIMAL SCIENCES

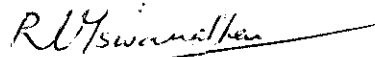
Mannuthy- Trichur

**1981**

## DECLARATION

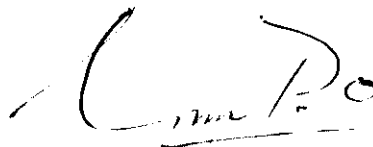
I hereby declare that this thesis entitled "CHLORAL HYDRATE FOR GENERAL ANAESTHESIA IN GOATS" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship, or other similar title, of any other University or Society.

Mannathy,  
31-7-1981.

  
R. VISWANATHAN

**CERTIFICATE**

**Certified that this thesis, entitled  
"CHLORAL HYDRATE FOR GENERAL ANAESTHESIA IN  
GOATS" is a record of research work done  
independently by Sri. R. Viswanathan under  
my guidance and supervision and that it has  
not previously formed the basis for the award  
of any degree, fellowship, or associateship  
to him.**



**DR. P.O. GEORGE  
(Chairman, Advisory Board)  
Professor  
Department of Surgery,  
College of Veterinary and Animal Sciences.**

**Mannuthy,  
31-7-1961.**

## ACKNOWLEDGEMENT

I am deeply indebted to Dr.P.O.George, Professor of Surgery and Chairman of the Advisory Committee for his able guidance and constant encouragement throughout the study.

I express my deep sense of gratitude to Dr.K.N. Muralidharan Nayar and Dr.S.Haveendran Nayar, Associate Professors of Surgery and Dr. C. Abraham Varkey, Assistant Professor of Surgery, Dr.C.P. Neelakanta Iyer, Associate Professor of Animal Reproduction and Dr. Jacob V. Cheeran, Associate Professor of Pharmacology for their valuable help and advice at various stages of this work as members of the Advisory Committee.

My sincere thanks are due to Dr.T.Sarada Amma, Assistant Professor and Dr.K. Rajankutty, Junior Assistant Professor, Department of Surgery for their earnest help rendered.

I also express my sincere thanks to Dr. P.U. Supendran, Professor of Statistics and Dr.

▼

**Sesanna Iype, Associate Professor of Genetics  
and Breeding for the help rendered.**

**Grateful acknowledgement is made to Dr.  
A. Rajan, Professor of Pathology for his valuable  
help rendered.**

**I sincerely thank Dr.P.G.Nair, the former  
Dean and Dr.M. Krishnan Nair, the present Dean,  
College of Veterinary and Animal Sciences, Mannuthy  
for the facilities provided for carrying out the  
study.**

**I am grateful to Dr.P.K. Nambiar, Director  
of Animal Husbandry for deputing me for the M.V.Sc.  
programme.**

**My thanks are due to Sri. T.D.Jose for the  
neat typing.**

**R. VISWANATHAN**

## TABLE OF CONTENTS

		P a g e
INTRODUCTION	..	1
REVIEW OF LITERATURE	..	3
MATERIALS AND METHODS	..	10
RESULTS	..	15
TABLES	..	30
DISCUSSION	..	39
SUMMARY	..	44
REFERENCES	..	47

ABSTRACT

-----

## LIST OF TABLES

Table No.	Page.
1. Anaesthetic effect after administration of (i) chloral hydrate 6% solution alone at the rate of 1 ml/kg bodyweight and (ii) Siquil at the rate of 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution, at the rate of 1 ml/kg body-weight.	30
2. Anaesthetic effect after administration of (i) chloral hydrate 6% solution alone at the rate of 1.5 ml/kg bodyweight and (ii) Siquil at the rate of 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution, at the rate of 1.5 ml/kg bodyweight.	31
3. Anaesthetic effect after administration of (i) chloral hydrate 6% solution alone at the rate of 2.0 ml/kg bodyweight and (ii) Siquil at the rate of 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution, at the rate of 2.0 ml/kg bodyweight.	32
4. Temperature, pulse and respiration before and after administration of (i) chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight alone and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight.	33
5. Temperature, pulse and respiration before and after administration of (i) chloral hydrate 6% solution at the rate of 1.5 ml/kg bodyweight alone and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1.5 ml/kg bodyweight.	34

6. Temperature pulse and respiration before and after administration of (i) chloral hydrate 6% solution at the rate of 2.0 mg/kg bodyweight alone and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 2.0 ml/kg bodyweight. 35
7. Haematological values before administration and fifteen minutes after administration of (i) chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight. 36
8. Haematological values before administration and fifteen minutes after administration of (i) chloral hydrate 6% solution at the rate of 1.5 ml/kg bodyweight and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1.5 ml/kg bodyweight. 37
9. Haematological values before administration and fifteen minutes after administration of (i) chloral hydrate 6% solution at the rate of 2.0 ml/kg bodyweight and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 2.0 ml/kg bodyweight. 38



# INTRODUCTION

## INTRODUCTION

Veterinarians have to face the problem of anaesthetising animals of different species and temperament. Variations amongst individuals are also remarkable. General anaesthesia has been practiced in animals from ancient days. The advent of modern anaesthetic techniques dates back to the last century. Humbert (1875) was the first to use chloral hydrate intravenously in horses as a general anaesthetic and narcotic (cited by Hall, 1971 and Jones *et al.* 1978).

The pharmacological properties of chloral hydrate closely resemble that of trichloroethanol and trichloroacetic acid. Trichloroethanol is excreted partly through kidney and partly after it is conjugated in liver mainly with glucuronic acid to form urochloralic acid.

Chloral hydrate is a good hypnotic, but a poor anaesthetic. In hypnotic doses, medullary centres are not effected but in anaesthetic doses it depresses the respiratory centre and the vasomotor centre resulting in fall of blood pressure

(Lumb and Jones, 1973).

Chloral hydrate alone or in combination with magnesium sulphate and Nembutal had been extensively used as a general anaesthetic in large animal practice. Chloral hydrate is administered often in goats orally, intravenously and as a retention enema. However, a detailed systematic study on the use of intravenous administration of chloral hydrate at different dose levels, used alone or in combination with pre-anaesthetics like Trifluoroproxazine hydrochloride, appears to be necessary to recommend its use in clinical practice, and hence the present study.

# REVIEW OF LITERATURE

## REVIEW OF LITERATURE

Chloral hydrate was used as a narcotic and anaesthetic in horses by Humbert as early as 1875 and was first given by intravenously at a dose of 30 to 70 grammes. Negive (1908) made use of a 20 per cent solution of chloral hydrate for intravenous injection in horses (cited by Hall, 1971 and Jones *et al.* 1978).

Wilde (1962) had reported different doses of chloral hydrate for intravenous injection in calves, viz. a mean dose of 183.3 mg per kg bodyweight in 19 calves weighing 45.5 to 90.5 kg and a mean dose of 201.7 mg per kg bodyweight in six calves weighing 90.8 to 108.0 kg.

Berger (1966) had reported that in calves, chloral hydrate in a dose of 58 to 125 mg per lb bodyweight produced anaesthesia lasting for 16 to 50 minutes.

For anaesthetising camel, Bhargava and Vyas (1967) recommended a combination of chloral hydrate and magnesium sulphate each 12 per cent at a dose of 12 per 220 lb bodyweight.

Bals (1968) reported that, in goats, ten per cent solution of chloral hydrate at the rate of 0.08 to 0.1 g per kg bodyweight when administered intravenously after atropine sulphate or neuroleptics, produced narcosis within a few minutes and lasted for about half an hour. The animal recovered in one to two hours.

Gadgil et al. (1969) used a combination of chloral hydrate and magnesium sulphate in a proportion of 2:1, as general anaesthetic in 156 goats of different age groups. They observed that the duration of anaesthesia varied from 30 to 90 minutes with a recovery period of five to fifteen minutes. They also observed that 13 animals which were pregnant during the experimental study, delivered at full term.

Chandna et al. (1970) observed that in calves, chloral hydrate at the rate of 106 mg per kg bodyweight, showed a mean recovery time of 70 minutes. It was also

observed that the dose of chloral hydrate was reduced to 75 mg per kg bodyweight, when used in combination with a preanaesthetic. They also observed that there was significant acceleration in respiration and pulse rate but no significant variation in blood pressure. The recovery was prolonged by 10 to 14 minutes. The average duration of light anaesthesia was 30 minutes.

Hall (1971) reported that chloral hydrate at 20 per cent solution administered intravenously was satisfactory for anaesthetising horses. The dose of intravenous administration vary extensively, probably due to the variation with the rate of administration and other connected factors.

Hansa (1971) recommended a mixture of 30 grams of chloral hydrate and seven grammes of Magnesium sulphate in 420 ml of distilled water or physiological saline for general anaesthesia in horses.

Kumar et al. (1971) made a comparable evaluation of chloromax with and without pentobarbital sodium for inducing general anaesthesia in dogs and observed

that chloromag pentobarbital sodium combination was more effective than chloromag alone.

Kumar et al. (1971) made use of a solution containing 21 grams of chloral hydrate and 10.5 grammes of magnesium sulphate in 500 ml distilled water for general anaesthesia in dogs and found that the average quantity of the solution required to produce surgical anaesthesia was 7.7, 5.7, 3.6 and 5.5 ml per kg bodyweight respectively in controls, and when methadone, fluphenazine and triflupromazine hydrochloride were used as pre-medicaments. They did not observe any untoward reaction and the duration of surgical anaesthesia lasted for 22 to 45 minutes.

Singh et al. (1971) reported that, in buffaloes, the doses of chloromag solution containing 4.2 per cent chloral hydrate and 2 per cent magnesium sulphate, can be reduced from 2.1 ml per kg to 1.6 ml per kg bodyweight when premedicated with 0.1 mg per kg chlorpromazine hydrochloride or 1 mg per kg triflupromazine hydrochloride. The dose can also be reduced to 1.8 ml per kg bodyweight when promethazine hydrochloride at the rate of 0.1 mg per kg was used as premedicant, but it produced sudden fall in blood pressure.



Johari et al. (1972) used chloral and thiopenton sodium mixture intravenously for anaesthesia in buffalo calves and observed that administration of atropine sulphate 3 to 13 mg subcutaneously 30 minutes before inducing anaesthesia prevented excessive salivation and regurgitation.

Singh et al. (1972) administered 12 per cent solution of chloral hydrate as general anaesthetic at the rate of 20 ml per 50 kg bodyweight in cattle, which were starved overnight. These animals recovered from anaesthesia in 15 to 20 minutes. There was increase in glucose and serum level in blood samples taken 10 minutes after the injection of anaesthetic.

Sharma et al. (1973) had reported an increase in erythrocyte count, haemoglobin content and a decrease in mean corpuscular haemoglobin content and colour index, during chloromax or other anaesthesia in experimental dogs. These changes returned to normalcy after recovery. They further observed that chloromax anaesthesia produced leucopenia.

Rebesko and Mohamed (1974) used a mixture of 10 per cent solution of chloral hydrate and magnesium sulphate at the rate of 2.5 ml per kg bodyweight in twenty rams. They observed that, the mixture produced satisfactory surgical anaesthesia with only a slight transient phase of excitement. The solution did not produce any serious depressant effect in heart rate and respiration.

Singh et al. (1974) had reported a decrease in total erythrocyte and haemoglobin content and an increase in leucocyte count during chloroform sedation in bovines. Increase in serum calcium and blood glucose concentration was reported by them.

Majer et al. (1978) reported a significant fall in haemoglobin content and packed cell volume along with an increase in leucocyte count following chloral hydrate anaesthesia in buffalo calves.

Gadgil et al. (1978) made use of a mixture of chloral hydrate and magnesium sulphate in the ratio of 2:1 in goats and the average dose was found to be 75 ml with a range of 45 - 95 ml and the

duration of anaesthesia was reported to be varying from 30 to 90 minutes and the recovery period varied from 5 to 15 minutes.

Lakshminpathy and Vijayakumar (1980) studied the effect of Siquil at the rate of 5 mg per 100 lb body-weight reconstituted in 5 ml distilled water as slow intravenous injection in 16 buffalo calves. The rectal temperature showed a gradual fall and in four cases, temperature became sub-normal. There was an initial rise in the rate of respiration and subsequent downward trend from  $18.19 \pm 1.69$  to  $13.38 \pm 1.37$  at 30 minutes interval. A gradual fall in pulse rate was also recorded.

## MATERIALS AND METHODS

## MATERIALS AND METHODS

The experimental study was conducted on 36 apparently healthy, Alpine - Malabari cross-bred bucks, aged from 17 to 30 months and weighing from 22 to 39.5 kg.

The animals were kept under observation for two weeks and treated for ecto and endo parasites, before the experiment.

These animals were divided into two groups, viz., Group I and II, each group consisting of 18 animals. Group I and II were further subdivided into three subgroups viz., A, B and C, each subgroups consisting of six animals. These animals were numbered serially from 1 to 6 viz:

Group I A-1, A-2, A-3, A-4, A-5 and A-6;  
I B-1, B-2, B-3, B-4, B-5 and B-6;  
I C-1, C-2, C-3, C-4, C-5 and C-6;

Group II A-1, A-2, A-3, A-4, A-5 and A-6;  
II B-1, B-2, B-3, B-4, B-5 and B-6;  
II C-1, C-2, C-3, C-4, C-5 and C-6.

### Preparation of animals.

The animals were fasted over night and were weighed before the administration of the anaesthetic. The site

was prepared by clipping the hairs and painting Tr. of Iodine.

In Group I, freshly prepared chloral hydrate six per cent solution was administered intravenously at the rate of

- (i) 1 ml per kg bodyweight in I A,
- (ii) 1.5 ml per kg bodyweight in I B and
- (iii) 2 ml per kg body weight in I C.

In Group II, triflupromazine hydrochloride (Siquil<sup>\*</sup>) followed by freshly prepared chloral hydrate six per cent solution were administered intravenously at the rate of

(i) 0.2 mg per kg bodyweight of triflupromazine hydrochloride followed by 1 ml per kg bodyweight of chloral hydrate six per cent solution in II A,

(ii) 0.2 mg per kg bodyweight of triflupromazine hydrochloride followed by 1.5 ml per kg bodyweight of chloral hydrate six per cent solution in II B and

(iii) 0.2 mg per kg bodyweight of triflupromazine hydrochloride followed by 2 ml per kg bodyweight

---

\* Siquil (Vety.) a product of Sarabhai Chemicals Private Ltd., containing 20 mg of Triflupromazine hydrochloride in 1 ml of the solution.

of chloral hydrate six per cent solution in II C.  
Technique.

The animal was controlled in the standing position. The pulse, temperature and respiration were recorded before the administration of the anaesthetic. The jugular vein was raised and a hypodermic needle, 18 B.V.G. was introduced into the jugular vein and five millilitres of blood was collected into a vial containing EDTA (Ethylene diamine tetra acetate) for haematological studies. Through the same needle, in Group I, chloral hydrate six per cent solution and in Group II, trifluorpromazine hydrochloride solution followed by chloral hydrate six per cent solution were administered as slow intravenous injection.

The blood samples were collected again after fifteen minutes of administration of the anaesthetic. The following haematological values were studied:

- i. total erythrocytes,
- ii. total leucocytes,
- iii. Haemoglobin gm percentage and
- iv. Packed Cell Volume percentage.

A haemocytometer was used for the estimation of the total erythrocyte and leucocyte counts.

For erythrocyte count, Hayem's fluid and for leucocyte count, Thomas fluid were used as the diluent. Haemoglobin estimation was done using Sahl's acid Haematin method making use of a haemoglobinometer. The packed cell volume estimation was done by a Wintrobe haematocrit.

During the experiment, the following observations were made

- i) Temperature, pulse and respiration before administration of anaesthetic and at five minutes interval after administration of anaesthetic till the 20th minute.
- ii) Volume of anaesthetic administered.
- iii) Time taken for intravenous injection.
- iv) Time taken for incoordination of limbs.
- v) Time taken for disappearance of palpebral reflex.
- vi) Time taken for assuming recumbency.
- vii) Time taken for reappearance of palpebral reflex.
- viii) Duration of recumbency.
- ix) Time taken for complete recovery from anaesthesia.



- x) Post anaesthetic observations, if any.
- xi) Haematological estimations immediately before and fifteen minutes after administration of anaesthetic.

## RESULTS

## RESULTS

The observations in general with respect to each group of animals are presented in Tables I to 9.

## Group I A

The data are presented in Tables 1, 4 and 7.

The average bodyweight of the animals in this group was  $30.92 \pm 2.70$  kg. Chloral hydrate at the rate of 1 ml per kg bodyweight as a six per cent solution was administered intravenously. The time taken for the intravenous injection was  $30.83 \pm 7.16$  seconds.

The palpebral reflex disappeared by  $4.13 \pm 1.01$  minutes. Incoordination of movements was observed by  $1.50 \pm 0.29$  minutes. Only one animal (No.4) assumed sternal recumbency by the 11th minute which persisted for four minutes. Palpebral reflex disappeared in four animals while it was present in two animals (No.4 and 6). Incoordination of movements was not observed in two animals (Nos. 2 and 6). Palpebral reflex reappeared by  $8.13 \pm 2.24$  minutes. The animal became apparently normal in gait by  $12.00 \pm 1.58$  minutes.

The temperature, pulse and respiration recorded before the administration of the anaesthetic were  $102.87 \pm 0.30^{\circ}\text{F}$ ,  $83.33 \pm 2.77$  per minute and  $18.33 \pm 0.80$  per minute respectively. The temperature during the 5th, 10th, 15th and 20th minutes after the administration of the anaesthetic was  $102.83 \pm 0.41^{\circ}\text{F}$ ,  $102.57 \pm 0.34^{\circ}\text{F}$ ,  $102.67 \pm 0.31^{\circ}\text{F}$  and  $102.60 \pm 0.31^{\circ}\text{F}$  respectively.

The pulse rate during the 5th, 10th, 15th and 20th minutes after the administration of the anaesthetic was  $92.67 \pm 2.77$ ,  $91.33 \pm 3.49$ ,  $88.00 \pm 2.25$  and  $86.00 \pm 3.35$  per minute respectively.

The respiration during the 5th, 10th, 15th and 20th minute after administration of the anaesthetic was  $21.33 \pm 0.80$ ,  $21.33 \pm 1.43$ ,  $20.67 \pm 1.09$  and  $18.33 \pm 0.62$  per minute respectively.

The haemogram recorded before the administration of the anaesthetic was as follows:

RBC -  $8.98 \pm 1.07$  million/e.m.m.,  
 WBC -  $7650.00 \pm 340.59$ /e.m.m.,  
 Hb -  $9.83 \pm 0.35$  g % and  
 PCV -  $33.33 \pm 2.03$  %.

The haemogram recorded fifteen minutes after the administration of chloral hydrate was as follows:

RBC -  $8.27 \pm 1.228$  million/c.m.m.,

WBC -  $8475.00 \pm 310.85$ /c.m.m.,

Hb -  $9.37 \pm 0.53$  g % and

PCV -  $30.50 \pm 0.563$  %

All the animals started feeding immediately after recovery but two animals were dull for few hours.

#### Group I B

The data are tabulated and presented in Tables 2, 5 and 8.

The average bodyweight of the animals in this group was  $29.58 \pm 2.72$  kg. Chloral hydrate at the rate of 1.5 ml per kg bodyweight in a six per cent solution was administered intravenously. The time taken for the administration was  $55.00 \pm 5.92$  seconds.

The palpebral reflex disappeared by  $1.30 \pm 0.30$  minutes. Incoordination of movements was observed by  $0.88 \pm 0.13$  minutes. Animals except No.1 and 6 became recumbent by  $1.13 \pm 0.32$  minutes. Of these one

animal (No.4) assumed lateral recumbency, two animals (Nos. 3 and 5) assumed sternal recumbency and then lateral recumbency, while animal No.2 remained in sternal recumbency alone. Salivation was observed in two animals (Nos. 3 and 4), and incoercion was observed in three animals (Nos. 3, 4 and 5). Dilatation of pupil was noticed only in one animal (No.2).

Palpebral reflex reappeared by  $14.90 \pm 1.38$  minutes. The animals were in recumbent position for  $14.88 \pm 4.32$  minutes. The animals became apparently normal in gait by  $20.88 \pm 1.09$  minutes.

The temperature, pulse and respiration recorded before the administration of the anaesthetic were  $102.47 \pm 0.25^{\circ}F$ ,  $78.67 \pm 2.46$  per minute and  $16.67 \pm 0.67$  per minute respectively.

The temperature during the 5th, 10th, 15th and 20th minute after the administration of anaesthetic was  $102.77 \pm 0.33^{\circ}F$ ,  $102.47 \pm 0.27^{\circ}F$ ,  $102.30 \pm 0.25^{\circ}F$  and  $102.37 \pm 0.25^{\circ}F$  respectively.

The pulse rate during the 5th, 10th, 15th and 20th minute after the administration of the anaesthetic

was  $98.00 \pm 2.25$ ,  $96.33 \pm 3.95$ ,  $98.67 \pm 3.25$   
and  $99.00 \pm 3.38$  per minute respectively.

The respiration during the 5th, 10th, 15th  
and 20th minutes after the administration of the  
anaesthetic was  $21.50 \pm 1.34$ ,  $20.00 \pm 0.90$ ,  
 $20.67 \pm 1.52$  and  $19.67 \pm 1.49$  per minute respectively.

The haemogram recorded before the administ-  
ration of the anaesthetic was as follows:

RBC -  $6.00 \pm 0.35$  million/c.m.m.,  
WBC -  $6808.33 \pm 1260.19$ /c.m.m.,  
Hb -  $9.42 \pm 0.27$  g % and  
PCV -  $30.50 \pm 1.67$  %

The haemogram recorded fifteen minutes after  
the administration of chloral hydrate was as follows:

RBC -  $6.03 \pm 0.39$  million/c.m.m.,  
WBC -  $8133.33 \pm 754.39$ /c.m.m.,  
Hb -  $8.20 \pm 0.38$  g % and  
PCV -  $30.17 \pm 1.49$  %

All the animals started feeding immediately  
after recovery.

#### Group I C

The data are presented in tables 3, 6 and

The average body-weight of the animals in this group was  $30.17 \pm 2.28$  kg. Chloral hydrate at the rate of 2 ml per kg bodyweight as a six per cent solution was administered intravenously. The time taken for the intravenous injection was  $78.33 \pm 8.75$  seconds.

The palpebral reflex disappeared by  $3.83 \pm 0.75$  minutes and reappeared by  $9.67 \pm 3.51$  minutes. The incoordination of movements was observed by  $1.33 \pm 0.49$  minutes.

All the animals, except Nos. 2 and 6, became recumbent by  $2.00 \pm 1.08$  minutes. Out of these, three animals (Nos. 3, 4 and 5) assumed lateral recumbency, one animal (No.1) assumed sternal recumbency. Dilatation of pupil was noticed in two animals (Nos. 3 and 4).

The period of recumbency in this group was  $12.75 \pm 6.63$  minutes. The animal became apparently normal in gait by  $47.83 \pm 12.41$  minutes.

The temperature, pulse and respiration recorded before the administration of the anaesthetic were



102.00 ± 0.16° F, 80.50 ± 3.36 per minute and 20.33 ± 1.96 per minute respectively.

The temperature during the 5th, 10th, 15th and 20th minutes after the administration of the anaesthetic was 102.10 ± 0.10° F, 101.87 ± 0.20° F, 101.97 ± 0.20° F and 102.13 ± 0.28° F respectively.

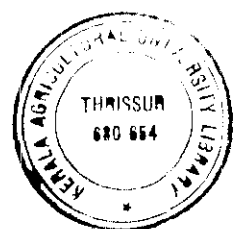
The pulse rate during the 5th, 10th, 15th and 20th minutes after the administration of anaesthetic was 104.00 ± 6.12 per minute, 94.67 ± 3.17, 93.67 ± 2.85 and 90.00 ± 3.46 per minute respectively.

The respiration during the 5th, 10th, 15th and 20th minute after administration of the anaesthetic was 22.50 ± 1.93, 20.66 ± 0.84, 17.67 ± 0.61 and 18.67 ± 0.99 per minute respectively.

The haemogram recorded before the administration of the anaesthetic was as follows:

- RBC - 6.42 ± 0.16 million/c.c.m.
- WBC - 8250 ± 381.88/c.c.m.,
- Hb - 9.52 ± 0.20 g % and
- PCV - 29.50 ± 1.45 %

The haemogram recorded fifteen minutes after the



administration of chloral hydrate was as follows:

RBC -  $5.67 \pm 0.18$  million/c.mm.

WBC -  $8416.67 \pm 624.72$ /c.mm.

Hb -  $8.42 \pm 0.20$  g % and

PCV -  $28.17 \pm 1.28$  %.

All the animals started feeding immediately after recovery.

#### Group II A

The data are presented in tables 1, 4 and 7.

The average bodyweight of the animals in this group was  $27.33 \pm 2.68$  kg. Trifluoperazine hydrochloride solution at the rate of 0.2 mg per kg bodyweight followed by chloral hydrate at the rate of 1 ml per kg bodyweight as a six per cent solution was administered intravenously. The time taken for completing injection was  $36.00 \pm 12.08$  seconds.

The palpebral reflex disappeared by  $2.92 \pm 0.52$  minutes. Incoordination of movements was observed by  $4.50 \pm 1.60$  minutes. Out of the six animals, only one animal (No.3), assumed the position of sternal recumbency by 10th minute which persisted for one minute. Drowsiness and drooping of head were noticed in two animals (No.1 and 4).

Palpebral reflex reappeared by  $10.83 \pm 1.80$  minutes. The animal became apparently normal in gait by  $14.17 \pm 2.83$  minutes.

The temperature, pulse and respiration recorded before the administration of the anaesthetic were  $102.07 \pm 0.32^{\circ}\text{F}$ ,  $84.67 \pm 4.46$  per minute and  $22.50 \pm 1.66$  per minute respectively.

The temperature during the 5th minute, 10th, 15th and 20th minute after the administration of the anaesthetic was  $102.33 \pm 0.33^{\circ}\text{F}$ ,  $102.13 \pm 0.40$ ,  $101.83 \pm 0.34$  and  $101.70 \pm 0.33$  respectively.

The pulse during the 5th, 10th, 15th and 20th minutes after the administration of the anaesthetic was  $98.00 \pm 3.66$ ,  $104.00 \pm 2.00$ ,  $93.61 \pm 5.13$  and  $91.00 \pm 3.0$  per minute respectively.

The respiration during the 5th, 10th, 15th and 20th minutes after the administration of the anaesthetic was  $25.67 \pm 1.73$ ,  $23.00 \pm 2.46$ ,  $23.33 \pm 2.30$  and  $20.33 \pm 1.66$  per minute respectively.

The haemogram recorded before the administration of the anaesthetic was as follows:

RBC -  $10.08 \pm 1.05$  million/c.mm.,  
 WBC -  $8333.33 \pm 353.33$ /c.mm.,  
 Hb -  $10.13 \pm 0.18$  g % and  
 PCV -  $31.67 \pm 1.12$  %.

The haemogram recorded fifteen minutes after the administration of chloral hydrate was as follows:

RBC -  $9.76 \pm 1.54$  million/c.mm.,  
 WBC -  $8383.33 \pm 174.01$ /c.mm.,  
 Hb -  $9.72 \pm 0.29$  g % and  
 PCV -  $31.00 \pm 1.00$  %.

The animals were normal in feeding after recovery.

#### Group II B

The data are presented in Tables 2, 5 and 8.

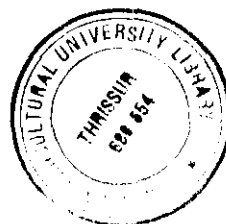
The average bodyweight of the animals in this group was  $30.17 \pm 2.39$  kg. Triflupromazine hydrochloride solution at the rate of 0.2 mg per kg bodyweight followed by chloral hydrate at the rate of 1.5 ml per kg bodyweight as a six per cent solution was administered intravenously. The time

taken for the injection was  $76.67 \pm 9.10$  seconds.

The palpebral reflex disappeared by  $1.00 \pm 0.52$  minutes and reappeared by  $49.00 \pm 14.10$  minutes. Incoordination of movements was observed by  $0.50 \pm 0.32$  minutes. All the animals, except two, (Nos. 5 & 6) became recumbent by  $0.63 \pm 0.38$  minutes. Out of the four animals which became recumbent, three animals (Nos. 1, 2 and 3), assumed lateral recumbency following sternal recumbency and one animal (No.4), assumed lateral recumbency alone. Salivation was observed in three animals (Nos.1, 2 and 3). Incoordination of movements was not observed in one animal (No.5). The period of recumbency was persisted for  $36.63 \pm 8.75$ . The animals became apparently normal in gait by  $50.50 \pm 13.82$ .

The temperature, pulse and respiration recorded before the administration of the anaesthetic were  $102.32 \pm 0.22^{\circ}F$ ,  $88.00 \pm 3.06$  per minute and  $18.33 \pm 2.29$  per minute respectively.

The temperature during the 5th, 10th, 15th and 20th minute after the administration of the



anaesthetic was  $101.90 \pm 0.28^{\circ}\text{F}$ ,  $101.47 \pm 0.34^{\circ}\text{F}$ ,  $101.13 \pm 0.40^{\circ}\text{F}$ ,  $101.10 \pm 0.45^{\circ}\text{F}$  respectively.

The pulse rate during the 5th, 10th, 15th and 20th minutes after the administration of the anaesthetic were  $99.00 \pm 6.28$ ,  $95.00 \pm 7.44$ ,  $92.67 \pm 5.97$  and  $93.33 \pm 3.78$  per minute respectively.

The respiration during the 5th, 10th, 15th and 20th minutes after the administration of anaesthetic was  $22.00 \pm 2.31$ ,  $21.17 \pm 1.33$ ,  $20.83 \pm 1.60$  and  $22.67 \pm 2.35$  per minute respectively.

The haemogram recorded before administration of the anaesthetic was as follows:

RBC =  $10.00 \pm 1.35$  million/c.mm.,  
 WBC =  $8050 \pm 275.389$ /c.mm.,  
 Hb =  $10.36 \pm 0.46$  g % and  
 PCV =  $32.00 \pm 0.86$  %.

The haemogram recorded fifteen minutes after the administration of chloral hydrate was as follows:

RBC =  $9.15 \pm 1.17$  million/c.mm.,  
 WBC =  $8400 \pm 163.30$ /c.mm.,  
 Hb =  $9.88 \pm 0.50$  g % and  
 PCV =  $29.50 \pm 0.34$  %.

All the animals started feeding immediately after recovery.

## GROUP II C

The data are presented in Tables 3, 6 and

9.

The average body-weight of the animals in this group was  $31.17 \pm 2.48$  kg. Trifluopromazine hydrochloride solution at the rate of 0.2 mg per kg body-weight followed by chloral hydrate at the rate of 2 ml per kg bodyweight as a six per cent solution was administered intravenously. The time taken for the intravenous administration was  $96.67 \pm 12.02$  seconds.

The palpebral reflex disappeared by  $0.67 \pm 0.49$  minutes. Incoordination of movements observed immediately following the injection. All the animals, except No.3, assumed recumbency immediately after the injection. While, animal No.3 assumed recumbent position only after one minute following the injection. Four animals (Nos.2, 3, 4 and 6), assumed lateral recumbency following sternal recumbency and the remaining two animals (Nos. 1 and 5) assumed lateral recumbency alone. Salivation and lacrimation were observed in two animals (Nos. 1 and 2). Lacrimation alone was noticed in three animals (Nos. 4, 5 and 6).

The temperature, pulse and respiration recorded before the administration of the anaesthetic were  $102.23 \pm 0.23^{\circ}\text{F}$ ,  $81.83 \pm 4.43$  per minute and  $21.50 \pm 1.50$  per minute respectively.

The temperature during the 5th, 10th, 15th and 20th minute after the administration of the anaesthetic was  $101.93 \pm 0.36$ ,  $101.89 \pm 0.19$ ,  $101.73 \pm 0.22$  and  $101.37 \pm 0.25$  per minute respectively.

The pulse during the 5th, 10th, 15th and 20th minutes after the administration of the anaesthetic was  $98.67 \pm 3.79$ ,  $91.33 \pm 4.78$ ,  $69.32 \pm 3.82$  and  $91.00 \pm 5.13$  per minute respectively.

The respiration during the 5th, 10th, 15th and 20th minute after the administration of anaesthetic was  $21.17 \pm 2.35$ ,  $20.81 \pm 2.37$ ,  $20.17 \pm 1.47$  and  $20.67 \pm 1.67$  per minute respectively.

The haemogram recorded before administration of the anaesthetic was as follows:

RBC -  $9.83 \pm 1.22$  million/c.mm.,  
 WBC -  $8100.00 \pm 89.44$ /c.mm.,  
 Hb -  $10.43 \pm 0.46$  g % and  
 PCV -  $31.50 \pm 0.62$  %.



The haemogram recorded fifteen minutes after the administration of chloral hydrate was as follows:

RBC =  $9.73 \pm 1.22$  million/c.mm.,

WBC =  $8150.00 \pm 131.02$ /c.mm.,

Hb =  $9.88 \pm 0.45$  g % and

PCV =  $29.83 \pm 0.54$  %.

All the animals started feeding immediately after recovery.

# TABLES

Table 1. Anaesthetic effect after administration of (i) chloral hydrate 6% solution alone at the rate of 1 ml/kg bodyweight and (ii) Siquil at the rate of 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution, at the rate of 1 ml/kg bodyweight.

Animal No.	Age (months)	Weight of the animal (kg)	Quantity of Siquil (mg)	Quantity of chloral hydrate (ml)	Time taken for injection (sec.)	TIME TAKEN FOR			DURATION OF		TIME TAKEN FOR	
						Disappearance of palpebral reflex (mts.)	Incoordination (mts.)	Recumbency (mts.)	Absence of palpebral reflex (mts.)	Recumbency (mts.)	Normal gait to reappear (mts.)	..
I-A-1	22v	24.0	-	24.0	35.0	2.5	2.0	N11	12.5	-	15.0	..
2	22	27.0	-	27.0	42.0	4.0	N11	N11	10.0	-	-	..
3	29	38.0	-	38.0	50.0	3.0	1.0	N11	8.0	-	11.0	..
4	27	36.5	-	36.5	48.0	N11	1.8	11.0	N11	4.0	14.0	..
5	19	24.0	-	24.0	45.0	7.0	2.0	N11	2.0	-	8.0	..
6	30	36.0	-	36.0	85.0	N11	N11	N11	N11	-	-	..
Mean	24.83	30.92	-	30.92	50.83	4.13	1.50	11.0	8.13	4.0	12.0	..
SE	± 1.82	± 2.70	-	± 2.70	± 7.16	± 1.01	± 0.29	± 0	± 2.24	± 0	± 1.58	
II-A-1	29	39.5	7.9	39.5	61.0	4.0	2.0	-	13.0	-	20.0	..
2	19	25.0	5.0	25.0	25.0	2.0	3.0	-	18.0	-	19.0	..
3	22	23.0	4.6	23.0	25.0	2.0	10.0	10.0	5.0	1.0	3.0	..
4	25	24.5	4.9	24.5	45.0	5.0	9.0	-	11.0	-	8.0	..
5	22	20.0	6.0	20.0	90.0	2.0	1.5	-	9.0	-	17.0	..
6	17	22.0	4.4	22.0	90.0	2.5	1.5	-	9.0	-	18.0	..
Mean	22.33	27.33	5.47	27.33	56.00	2.92	4.50	10.0	10.83	1.0	14.17	
SE	± 1.75	± 2.68	± 0.54	± 2.68	± 12.08	± 0.52	± 1.60	± 0.0	± 1.80	± 0.0	± 2.85	

Table 2. Anaesthetic effect after administration of (i) chloral hydrate 6% solution alone at the rate of 1.5 ml/kg bodyweight and (ii) Siquil at the rate of 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution, at the rate of 1.5 ml/kg bodyweight.

Animal No.	Age (months)	Weight of the animal (kg)	Quantity of Siquil (mg)	Quantity of chloral hydrate (ml)	Time taken for injection (sec.)	TIME TAKEN FOR			DURATION OF		TIME TAKEN FOR
						Disappearance of palpebral reflex (mts.)	Incoordination (mts.)	Recovery (mts.)	Absence of palpebral reflex (mts.)	Recumbency (mts.)	Normal gait to reappear (mts.)
I-B-1	22	24.5	-	36.75	55	2.0	-	-	13.0	-	-
2	25	25.5	-	38.25	45	2.0	1.0	2.0	12.0	3.0	18.0
3	19	24.0	-	36.0	40	1.0	1.0	1.0	18.0	22.0	22.0
4	22	27.5	-	41.25	45	0.5	0.5	0.5	18.5	20.5	20.5
5	27	37.0	-	55.5	70	1.0	1.0	1.0	19.0	14.0	23.0
6	29	39.0	-	38.5	75	-	-	-	-	-	-
Mean	24.00	29.58	-	44.93	59.00	1.30	0.88	1.13	14.90	14.88	20.88
SD	± 1.51	± 2.72	-	± 4.09	± 5.92	± 0.30	± 0.13	± 0.32	± 1.38	± 1.32	± 1.09
II-B-1	25	25.0	5.0	37.50	55	Immediate	Immediate	Immediate	104.0	60.0	100.0
2	30	35.0	7.0	52.50	55	Immediate	Immediate	1.0	65.0	19.0	60.0
3	22	27.0	5.4	40.50	100	Immediate	Immediate	Immediate	30.0	29.0	31.0
4	23	32.5	6.5	48.75	90	2.0	1.5	1.5	28.0	38.5	38.5
5	22	23.5	4.70	35.25	60	3.0	-	-	7.0	-	-
6	29	38.0	7.60	57.00	100	1.0	1.0	-	60.0	-	23.0
Mean	25.17	30.17	6.07	45.25	76.67	1.00	0.50	0.63	49.00	36.63	50.50
SD	± 1.45	± 2.39	± 0.48	± 3.58	± 9.10	± 0.32	± 0.32	± 0.38	± 14.10	± 8.73	± 13.82

Table 3. Anaesthetic effect after administration of (i) chloral hydrate 6% solution alone at the rate of 2.0 ml/kg bodyweight and (ii) Siquil at the rate of 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution, at the rate of 2.0 ml/kg bodyweight.

Animal No.	Age (months)	Weight of the animal (kg)	Quantity of Siquil (mg)	Quantity of chloral hydrate (ml)	Time taken for injection (sec.)	TIME TAKEN FOR			DURATION OF		TIME TAKEN FOR Normal gait to reappear (mts.)
						Disappearance of palpebral reflex (mts.)	Incoordination (mts.)	Recumbency (mts.)	Absence of palpebral reflex (mts.)	Recumbency (mts.)	
I-C-1	19	25.0	-	30	75	2.0	1.0	2.0	3.0	2.0	5.0
2	27	36.0	-	72	80	3.0	3.0	-	10.0	-	97.0
3	22	26.5	-	53	120	5.0	Immediate	1.0	2.0	7.0	30.0
4	22	23.5	-	47	62	1.0	Immediate	Immediate	24.0	32.0	32.0
5	30	34.5	-	69	68	3.0	2.0	3.0	15.0	10.0	53.0
6	25	25.5	-	51	65	3.0	2.0	-	4.0	-	50.0
Mean	24.16	30.17	-	57.00	78.33	3.83	1.33	2.00	9.67	12.75	47.83
	±	±	-	±	±	±	±	±	±	±	±
SE	1.62	2.28	-	4.36	8.75	0.75	0.49	1.08	3.51	6.63	12.41
II-C-1	27	36.0	7.2	72	120	Immediate	Immediate	Immediate	85.0	70.0	87.0
2	29	38.0	7.6	76	120	Immediate	Immediate	Immediate	42.0	40.0	57.0
3	19	25.0	5.0	50	120	1.0	Immediate	5.0	53.20	20.0	99.0
4	25	25.0	5.0	50	60	Immediate	Immediate	Immediate	53.00	30.0	66.0
5	30	35.5	7.1	71	100	Immediate	Immediate	Immediate	70.00	35.0	70.0
6	22	27.5	5.5	55	60	Immediate	Immediate	Immediate	95.0	78.0	93.0
Mean	25.33	31.17	6.23	62.33	96.67	0.67	0.0	0.83	66.33	47.00	78.67
	±	±	±	±	±	±	±	±	±	±	±
SE	1.73	2.48	0.49	12.02	12.02	0.49	0	0.83	8.43	9.88	6.82

**Table 4. Temperature, pulse and respiration before and after administration of (I) chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight alone and (II) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight.**

Animal No.	Before administration of anaesthetic (°F)	TEMPERATURE After administration				Before administration of anaesthetic	PULSE After administration				Before administration	RESPIRATION After administration			
		5th (°F)	10th (°F)	15th (°F)	20th (°F)		5th	10th	15th	20th		5th	10th	15th	20th
I-A-1	103.0	103.2	102.0	102.0	102.0	90	100	100	90	90	20	22	24	30	20
2	102.2	101.2	102.0	102.0	102.0	82	88	84	84	82	20	20	22	22	20
3	103.8	103.8	103.4	103.4	103.4	72	72	80	80	72	16	16	20	16	16
4	103.2	103.6	103.6	103.6	103.2	80	108	96	88	88	18	22	20	24	18
5	103.2	103.2	102.8	103.0	103.0	88	100	100	90	88	16	20	20	20	18
6	101.8	102.0	101.8	102.0	101.8	88	88	88	96	96	20	20	28	20	18
Mean	102.87	102.83	102.57	102.67	102.60	83.33	92.67	91.33	88.00	86.00	18.33	21.33	21.33	20.67	18.33
SE	± 0.30	± 0.81	± 0.86	± 0.31	± 0.31	± 2.77	± 2.77	± 2.49	± 2.25	± 3.23	± 0.80	± 0.80	± 1.43	± 1.09	± 0.61
II-A-1	102.8	102.8	102.2	102.0	101.0	88	100	104	80	82	20	18	16	18	16
2	101.8	101.8	101.4	101.8	101.8	74	100	100	82	88	24	28	18	18	20
3	102.0	102.6	102.0	102.2	102.2	88	108	110	86	86	20	28	24	20	18
4	103.2	103.6	103.6	103.0	103.0	88	80	100	100	100	17	24	20	24	20
5	101.2	101.4	101.2	101.0	101.0	100	102	110	110	100	30	30	30	30	28
6	101.4	101.6	101.4	101.0	101.2	70	98	100	104	90	24	26	30	30	20
Mean	102.07	102.33	102.13	101.83	101.70	84.67	98.00	104.00	93.61	91.00	22.50	25.67	23.00	23.33	20.33
SE	± 0.38	± 0.33	± 0.40	± 0.31	± 0.33	± 4.46	± 2.06	± 2.00	± 5.13	± 3.04	± 1.86	± 1.73	± 2.46	± 2.30	± 1.66

32

**Table 5. Temperature, pulse and respiration before and after administration of (i) chloral hydrate 6% solution at the rate of 1.5 ml/kg bodyweight alone and (ii) Sigull 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1.5 ml/kg bodyweight.**

Animal No.	Before administration of anaesthetic (°F)	TEMPERATURE				Before administration of anaesthetic	PULSE				Before administration	RESPIRATION			
		After administration					After administration					After administration			
		5th (°F)	10th (°F)	15th (°F)	20th (°F)		5th	10th	15th	20th		5th	10th	15th	20th
I-B-1	101.8	102.0	101.8	102.2	102.2	72	96	90	100	100	20	18	20	18	16
2	102.2	101.8	101.8	101.6	102.2	80	100	104	104	110	16	20	18	18	24
3	102.2	103.2	102.8	102.0	102.0	88	108	104	110	106	16	25	24	26	24
4	103.4	103.4	103.4	102.2	102.2	80	92	88	88	92	16	24	20	20	18
5	102.2	102.4	102.2	102.8	102.6	80	96	100	98	98	16	24	18	20	20
6	102.0	103.0	102.8	103.0	103.0	72	96	92	88	88	16	18	20	16	16
Mean	102.47	102.77	102.47	102.38	102.37	78.67	98.00	96.33	98.67	95.00	16.67	21.50	20.00	20.67	19.67
SE	± 0.25	± 0.33	± 0.27	± 0.21	± 0.15	± 2.46	± 2.25	± 2.95	± 2.25	± 3.38	± 0.67	± 1.34	± 0.90	± 1.58	± 1.49
II-B-1	103.0	102.2	102.0	101.8	101.6	86	80	72	80	88	18	16	16	24	20
2	101.6	101.6	100.4	100.2	100.2	78	100	108	88	100	16	28	24	24	30
3	102.0	102.0	101.2	101.0	100.8	92	112	96	100	96	15	20	20	18	20
4	102.0	101.0	101.4	101.2	100.0	100	100	106	96	90	20	20	23	23	20
5	102.8	103.0	102.8	102.6	103.0	88	112	120	116	106	16	20	22	18	18
6	102.5	101.6	101.0	100.0	101.0	84	86	76	76	80	18	18	20	18	18
Mean	102.32	101.90	101.47	101.13	101.10	88.00	99.00	93.00	92.67	93.33	18.83	22.00	21.17	20.83	22.67
SE	± 0.22	± 0.28	± 0.34	± 0.40	± 0.45	± 2.06	± 6.25	± 7.44	± 5.97	± 2.78	± 2.87	± 2.31	± 1.55	± 1.60	± 2.33

Table 6. Temperature pulse and respiration before and after administration of  
 (i) chloral hydrate 6% solution at the rate of 2.0 ml/kg bodyweight alone and  
 (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution  
 at the rate of 2.0 ml/kg bodyweight.

Animal No.	Before administration of anaesthetic (°F)	TEMPERATURE				Before administration of anaesthetic	PULSE				Before administration.	After administration			
		After administration					After administration					After administration			
		5th (°F)	10th (°F)	15th (°F)	20th (°F)		5th	10th	15th	20th		5th	10th	15th	20th
I-C-1	102.0	102.4	102.2	103.2	102.0	88	120	100	100	98	18	25	20	24	22
2	101.8	101.8	102.0	101.8	101.8	86	120	86	86	80	18	24	24	20	20
3	101.8	102.0	101.8	101.4	102.0	80	100	100	84	100	20	18	20	16	16
4	101.8	102.0	101.8	101.8	101.6	84	104	96	96	94	20	30	20	18	16
5	102.8	102.4	102.4	101.8	102.0	65	80	84	100	86	18	20	18	16	16
6	101.8	102.0	101.0	101.8	102.4	80	100	102	96	82	18	18	22	18	20
Mean	102.00	102.10	101.87	101.97	102.13	80.50	104.00	94.67	93.67	90.00	20.33	22.50	20.68	17.67	18.67
SE	± 0.16	± 0.10	± 0.20	± 0.25	± 0.28	± 3.36	± 6.12	± 3.17	± 2.85	± 3.46	± 1.97	± 1.93	± 0.84	± 0.62	± 0.99
II-C-1	103.0	103.0	102.6	102.6	101.6	88	96	86	96	86	24	14	16	20	20
2	102.2	102.8	102.0	101.4	101.4	76	100	90	80	70	16	17	15	16	17
3	101.8	101.8	102.0	101.8	101.4	78	100	100	92	108	22	28	28	22	22
4	102.0	102.0	101.6	101.6	102.0	88	82	84	76	96	18	20	20	17	17
5	101.8	101.2	101.3	101.0	100.2	64	106	110	100	92	24	25	28	20	20
6	102.8	101.6	101.8	102.0	101.6	94	108	78	92	94	25	20	18	26	28
Mean	102.23	101.93	101.87	101.73	101.37	81.83	98.67	91.33	89.33	91.00	21.50	21.17	20.81	20.17	20.67
SE	± 0.23	± 0.36	± 0.19	± 0.22	± 0.25	± 4.43	± 3.79	± 4.78	± 3.82	± 5.13	± 1.50	± 2.35	± 2.37	± 1.47	± 1.67



**Table 7. Haematological values before administration and fifteen minutes after administration of (i) chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1 ml/kg bodyweight.**

Animal No.	BEFORE ADMINISTRATION				15 MINUTES AFTER ADMINISTRATION			
	RBC million/c.mm	WBC/c.mm	Hb G %	P C V %	RBC million/c.mm	WBC/c.mm	Hb G %	P C V %
I-A-1	12.00	9000	10.5	32	11.8	9000	10.5	30
2	11.00	7500	11.0	28	11.0	8000	11.0	30
3	6.80	6950	9.4	39	5.9	8100	8.2	33
4	6.98	6650	9.6	40	5.8	8000	8.0	31
5	11.00	8000	10.0	30	10.0	9800	10.0	30
6	6.10	7800	8.5	31	5.12	7950	8.5	29
Mean	8.98	7650.00	9.83	32.33	8.27	8475.00	9.37	30.50
SE	$\pm 1.07$	$\pm 40.59$	$\pm 0.35$	$\pm 2.03$	$\pm 1.22$	$\pm 310.85$	$\pm 0.55$	$\pm 0.56$
II-A-1	7.50	10000.00	10.0	35	7.25	8500	9.0	30
2	11.80	8000.00	10.0	20	11.5	9000	10.0	30
3	12.00	8000.00	10.0	20	11.8	8000	9.9	30
4	6.20	8000	9.8	34	5.2	8500	9.0	36
5	12.00	8000	10.0	33	11.8	8500	9.8	30
6	11.00	8000	11.0	28	11.0	7800	10.9	30
Mean	10.08	8333.33	10.13	31.67	9.76	8383.33	9.77	31.00
SE	$\pm 1.05$	$\pm 333.33$	$\pm 0.18$	$\pm 1.12$	$\pm 1.54$	$\pm 174.01$	$\pm 0.29$	$\pm 1.00$

**Table 8. Haematological values before administration and fifteen minutes after administration of (i) chloral hydrate 6% solution at the rate of 1.5 ml/kg bodyweight and (ii) Signil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 1.5 ml/kg body-weight.**

Animal No.	BEFORE ADMINISTRATION				15 MINUTES AFTER ADMINISTRATION			
	RBC million/c.mm	WBC/c.mm	Hb %	P C V %	RBC million/c.mm	WBC/c.mm	Hb %	P C V %
I-B-1	4.8	9500	8.5	24	5.7	10000	8.0	35
2	5.2	5700	9.0	28	4.9	4800	7.2	26
3	6.2	7900	10.0	32	6.0	7700	9.0	31
4	6.0	7650	10.0	30	5.7	8200	9.0	29
5	7.0	9200	9.0	34	5.9	9600	7.0	32
6	6.8	11000	10.0	35	7.7	8500	9.0	30
Mean	6.80	6808.33	9.42	30.58	6.03	8133.33	8.20	30.17
SE	± 0.35	± 1269.19	± 0.27	± 1.67	± 0.39	± 754.39	± 0.38	± 1.49
II-B-1	6.0	8000	9.8	34	5.9	8000	9.0	30
2	6.0	7800	8.5	31	5.2	7900	8.0	29
3	11.0	8000	11.0	30	11.0	8500	10.8	30
4	12.0	8000	10.0	32	11.8	8500	9.6	30
5	11.0	9000	11.0	30	11.0	8500	10.9	28
6	14.0	7000	12.0	35	12.0	9000	11.0	30
Mean	10.00	8050	10.38	32	9.15	8400	9.88	29.50
SE	± 1.35	± 275.38	± 0.46	± 0.86	± 1.17	± 163.30	± 0.50	± 0.34

**Table 9. Haematological values before administration and fifteen minutes after administration of (i) chloral hydrate 6% solution at the rate of 2.0 ml/kg bodyweight and (ii) Siquil 0.2 mg/kg bodyweight followed by chloral hydrate 6% solution at the rate of 2.0 ml/kg bodyweight.**

Animal No.	BEFORE ADMINISTRATION				15 MINUTES AFTER ADMINISTRATION			
	RBC million/c.mm	WBC/c.mm	Hb g %	P C V %	RBC million/c.mm	WBC c.mm	Hb g %	P C V %
I-C-1	6.6	6500	10	30	5.2	6000	8.0	25
2	7.0	8500	10	35	6.0	9500	8.5	32
3	6.4	8500	10	30	6.2	9500	9.0	32
4	5.8	9000	8.8	30	5.4	10000	8.0	28
5	6.5	9000	8.5	28	6.0	9500	8.0	26
6	6.2	8000	9.8	34	5.2	8000	9.0	26
Mean	6.42	8250.00	9.52	29.50	5.67	8416.67	8.42	28.17
SE	± 0.16	± 381.88	± 0.28	± 1.45	± 0.18	± 624.72	± 0.20	± 1.28
II-C-1	12.0	8000	10.0	32.	11.8	7800	9.8	30
2	12.0	8000	12.0	32	12.0	8000	11.0	30
3	12.0	8000	11.0	30	11.8	8500	10.5	30
4	6.0	8200	9.8	34	6.0	8600	9.0	32
5	6.0	7900	8.8	31	5.8	8000	8.2	29
6	11.0	8000	11.0	30	11.0	8000	10.8	28
Mean	9.833	8100	10.43	31.50	9.73	8150.00	9.88	29.83
SE	± 1.22	± 89.44	± 0.46	± 0.62	± 1.22	± 131.02	± 0.45	± 0.54

## DISCUSSION

## DISCUSSION

In the present study, freshly prepared chloral hydrate six per cent solution was administered intravenously in Group I, while triflupromazine hydrochloride at the rate of 0.2 mg per kg bodyweight was also administered intravenously as the premedicant in Group II.

### Palpebral Reflex

When chloral hydrate alone was administered, palpebral reflex disappeared by  $4.13 \pm 1.01$ ,  $1.30 \pm 0.30$  and  $3.81 \pm 0.73$  minutes and reappeared after  $8.13 \pm 2.24$ ,  $14.90 \pm 1.38$  and  $9.67 \pm 3.51$  minutes respectively in I-A, I-B and I-C. When triflupromazine was also administered, it disappeared by  $2.92 \pm 0.52$ ,  $1.00 \pm 0.52$  and  $0.67 \pm 0.49$  minutes and reappeared after  $10.83 \pm 1.80$ ,  $49.00 \pm 14.10$  and  $66.33 \pm 8.43$  minutes respectively in II-A, II-B and II-C.

When the dose of chloral hydrate was increased, disappearance of palpebral reflex was quicker and the duration longer in both the groups.

It could be seen that disappearance of palpebral reflex took place quicker and the duration prolonged

when triflupromazine hydrochloride was used as the premedicant. In I-B, palpebral reflex disappeared quickest and persisted maximum.

#### Incoordination of Movements

When chloral hydrate alone was administered, incoordination of movements was observed by  $1.50 \pm 0.29$ ,  $0.88 \pm 0.13$  and  $1.33 \pm 0.49$  minutes and these animals assumed normal gait by  $12.00 \pm 1.58$ ,  $20.88 \pm 1.09$  and  $48.83 \pm 12.41$  minutes respectively in I-A, I-B and I-C. When triflupromazine hydrochloride was also administered, incoordination of movements was observed by  $4.50 \pm 1.60$  and  $0.50 \pm 0.32$  in II-A and II-B and was immediate in II-C, and these animals assumed normal gait after  $14.17 \pm 2.85$ ,  $50.50 \pm 13.82$  and  $78.67 \pm 11.82$  minutes respectively in II-A, II-B and II-C.

When the dose of chloral hydrate was increased, setting in of incoordination of movements was quicker and the time for assuming the normal gait was longer. The administration of triflupromazine hydrochloride shortened the time for setting in of incoordination of movements except in II-A and prolonged the time for assuming normal gait.

## Recumbency

In I-A, only one animal (No.4) assumed recumbent position at the 11th minute which persisted only for four minutes. In I-B, all except two animals (Nos.1 and 6), assumed recumbency in  $1.13 \pm 0.32$  minutes which persisted for  $14.88 \pm 4.32$  minutes. In I-C, two animals (Nos. 2 and 6) did not assume recumbency, while the rest four became recumbent within  $2.00 \pm 1.08$  minutes. Out of these four animals, one (No.4) became recumbent immediately following the injection. The duration of recumbency in these animals was  $12.75 \pm 6.63$  minutes. It is interesting to note that the animal which became recumbent immediately after the injection had the longest duration of recumbency (32 minutes). In II-A, only one animal (No.3) assumed recumbency at the 10th minute which persisted only for one minute. In II-B, only four animals assumed recumbent position in  $0.63 \pm 0.38$  minutes which persisted for  $36.63 \pm 8.75$  minutes. Out of these, two animals (Nos.1 and 3) assumed recumbency immediately after the injection. In II-C, all the animals, excepting

No.3 assumed recumbent position immediately after the injection. The animal No.3 assumed recumbency only after five minutes. In this subgroup, recumbency persisted for  $47.00 \pm 9.88$  minutes.

The onset of recumbency was quicker and the duration more prolonged when triflupromazine hydrochloride was used as the premedicant.

Period of recumbency recorded in the present study is in agreement with that of Bols (1968) wherein, administration of 0.08 to 0.1 g per kg bodyweight produced narcosis lasting for about half an hour.

#### Temperature, Pulse and Respiration

The temperature, pulse and respiration were recorded before and every five minutes after the administration of the anaesthetic upto 20 minutes. The variation in temperature was within  $1^{\circ}\text{F}$  and was not of any clinical significance.

There was an increase in the rate of respiration and pulse within five minutes of



administration of the drug and it showed a gradual downward trend. This is in agreement with the observations of Chandras et al. (1970) in calves.

#### Haemogram

The blood values were estimated before and 15 minutes after the administration of the anaesthetic.

There was reduction in the erythrocyte count, haemoglobin and packed cell volume, while there was slight increase in the leucocyte count. Observations recorded in the present study are in agreement with that of Singh et al. (1975) in bovines using chloromax and of Major et al. (1978) in buffalo calves using chloral hydrate.

## SUMMARY

## SUMMARY

The present study was conducted on 36 apparently healthy, Alpine - Malabari cross-bred bucks, aged from 17 to 30 months and weighing from 22 to 39.5 kg. They were divided into two groups viz., Group I and II, each consisting of 18 animals. Each of these groups was further divided into three subgroups viz. A, B and C and the animals were numbered serially from 1 to 6.

Freshly prepared chloral hydrate six per cent solution was administered intravenously at the rate of 1.0, 1.5 and 2.0 ml per kg bodyweight in Group I, while triflupromazine hydrochloride at the rate of 0.2 mg per kg bodyweight was also administered intravenously as the premedicant, in Group II.

When the dose of chloral hydrate was increased, disappearance of palpebral reflex was quicker and the duration longer in both the

groups. When triflupromazine hydrochloride was used as the premedicant, disappearance of palpebral reflex was more rapid and the duration further prolonged.

When the dose of chloral hydrate was increased, setting in of incoordination of movements was quicker and the time for assuming the normal gait was longer. When triflupromazine hydrochloride was administered as the premedicant the time for setting in of incoordination of movements was shortened and it prolonged the time for assuming normal gait.

Following administration of chloral hydrate, recumbency was not seen in Group I-A, excepting in one animal, whereas four animals each of the subgroups B and C, assumed recumbency. The onset of recumbency was quicker and the duration more prolonged when triflupromazine hydrochloride was used as the premedicant.

The temperature, pulse and respiration were

recorded before and every five minutes after the administration of the anaesthetic upto 20 minutes. The variation in temperature was within  $1^{\circ}\text{F}$  and was not of any significance. There was an increase in the rate of respiration and pulse within five minutes of administration of the drug and it showed a gradual downward trend.

The blood values were estimated before and 15 minutes after the administration of the anaesthetic. There was reduction in the erythrocyte count, haemoglobin and packed cell volume, while there was slight increase in the leucocyte count.

In goats, chloral hydrate six per cent solution at the rate of 2 ml per kg bodyweight may be administered intravenously for surgical procedures of about 30 minutes duration. Premedication with triflupromazine hydrochloride at the rate of 0.2 mg per kg bodyweight would give better results.

## REFERENCE

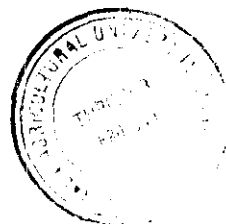
## REFERENCES

- Berger, J.G. (1966). Comparison of some anaesthetic techniques in young calves. Brit. Vet. J. 122 : 65
- Shargava, A.K. and Vyas, U.K. (1967). Chloroform anaesthesia in camel. Vet. Rec. 80 : 322.
- Bois, W. (1968). General anaesthesia in small ruminants. Veterinary Encyclopedia. Medical Book Company, Copenhagen. pp: 166.
- Chandran, I.S., Tyagi, R.P.S. and Gara, B.D. (1970). A study on evaluation of selected general anaesthetics in buffalo calves. Indian Vet. J. 47 (11) : 996 - 1004.
- Gadgil, B.A., Agarwal, S.P., Janikiraman, K. and Buch, N.C. (1978). General anaesthetic (chloral hydrate and magnesium sulphate) in buffaloes and goats. Indian J. Anim. Health. XVIII 1 (6) : 53.
- Gadgil, B.A., Janikiraman, K., Zain, P.M. and Buch, N.C. (1969). Chloral hydrate and magnesium sulphate as general anaesthetic in goats. Indian Vet. J. 46(3) : 231.
- Hall, L.V. (1971). Veterinary Anaesthesia and Analgesia. Bailliere Tindall, London. 7th Ed. pp. 287 - 288.
- Hansa, B. (1971). General anaesthesia, trial of a mixture of general anaesthetics with disposed toxicity in the horse. Cited in Vet. Bull. (1971) 41 (7): Abstr. No.3657.

- Jehari, M.P. and Sharma, S.P. (1972). General anaesthesia in buffaloes by intravenous use of chloral thiopentone sodium mixture. Indian J. vet. Sci. 2 (4) : 235 -239.
- Jones, M.L., Brooth, N.H. and McDonald, L.E. (1978). Veterinary Pharmacology and Therapeutics. The Iowa State University Press, U.S.A. 4th Ed. pp. 277 - 278.
- Kumar, A., Bahga, H.S., Singh, H. and Singh, R. (1971). Studies on chloromag anaesthesia with and without premedication in dogs. Indian vet. J. 48 (4) : 307 - 412.
- Kumar, A., Singh, H. and Singh, R. (1971). Clinical studies on chloromag anaesthesia in dogs. Indian vet. J. 48(2) : 185 - 189.
- Lakshminipathy, G.V. and Vijayakumar (1980). Siquil (Triflupromazine hydrochloride) sedation in buffalo calves (Bos bubalis) and its effect on rectal temperature, coccygeal pulse, heart rate and respiration. Indian vet. J. 57(3) : 211 - 214.
- Lumb, W.V. and Jones, E.W. (1973). Veterinary anaesthesia. Lea and Febiger, Philadelphia. pp. 324 - 325.
- Major, R., Nara, S.R. and Dutta, S.C., Gupta, H.K. and Saxena, S.P. (1978). Effect of chloral hydrate anaesthesia in certain haematological values in buffalo calves. Indian vet. J. 55 (11) : 884 - 889.



- Rebenko, B. and Mehamood, A.R. (1974). Combined chloral hydrate and magnesium sulphate anaesthesia of sheep. Cited in Vet. Bull. 45 (2) : Abstr. No.867.
- Sharma, D.K., Singh, R. and Joshi, H.C. (1973). Haematological changes under chloromag and ether anaesthesia in experimental dogs. J. Anim. Health Pr. 1 (2) : 93 - 98.
- Singh, H., Kumar, A., Bagha, H.S. and Singh, R. (1971). Studies on chloromag anaesthesia with and without premedication in buffaloes. Indian vet. J. 48 : 403 - 412.
- Singh, A.P., Sahu, S. and Singh, R. (1972). Chloral hydrate sedation in bovines a haematological study. Indian vet. J. 49(2) : 63 - 66.
- Singh, A.P., Sahu, S. and Singh, R. (1974). Chloromag sedation in bovines. Haematological study. Indian vet. J. 51 (6) : 457 - 460.
- Wide, J.K.H. (1962). Chloral hydrate anaesthesia in calves. Brit. vet. J. : 118 - 206.



# CHLORAL HYDRATE FOR GENERAL ANAESTHESIA IN GOATS

BY

**R. VISWANATHAN**

## **ABSTRACT OF A THESIS**

Submitted in partial fulfilment  
of the requirement for the degree

## **MASTER OF VETERINARY SCIENCE**

Faculty of Veterinary and Animal Sciences

Kerala Agricultural University

Department Of Surgery

**COLLEGE OF VETERINARY AND ANIMAL SCIENCES**

Mannuthy- Trichur

**1981**

## ABSTRACT

Thirtysix apparently healthy Alpine-Malabari cross-bred bucks aged from 17 to 30 months and weighing from 22 to 39.5 kg were used for the present study. They were divided into two groups viz., Group I and II, consisting of 18 animals in each. Each of these groups was further divided into three subgroups viz., A, B and C, consisting of six animals in each.

Freshly prepared chloral hydrate six per cent solution was administered intravenously at the rate of 1.0, 1.5 and 2.0 ml per kg bodyweight, while trifluoromazine hydrochloride (Siquil) at the rate of 0.2 mg per kg bodyweight was also administered intravenously as the premedicant, in Group II.

Following were the salient results obtained during the present study:

When the dose of chloral hydrate was increased,

- i) disappearance of palpebral reflex was quicker and duration was longer,
- ii) setting in of incoordination of movements was quicker and the time for assuming the normal gait was longer, and

iii) recumbency was seen only in higher doses.

Administration of triflupromazine hydrochloride (Siquil) as premedicant, increased the efficiency of anaesthetic effect in these animals.

Temperature variation consequent on the administration of chloral hydrate, with and without premedication, was not significant, the variation being less than 1° F.

There was an increase in the rate of respiration and pulse within five minutes of administration of the drug(s), which showed a gradual downward trend.

There was reduction in the erythrocyte count, haemoglobin and packed cell volume, while there was slight increase in the leucocyte count.

On the basis of the present study, intravenous administration of chloral hydrate, six per cent solution, at the rate of two ml per kg bodyweight, may be recommended in goats, for surgical procedures

171312

iii

of about half an hour duration. Premedication with triflupromazine hydrochloride at the rate of 0.2 mg per kg bodyweight would give better results.