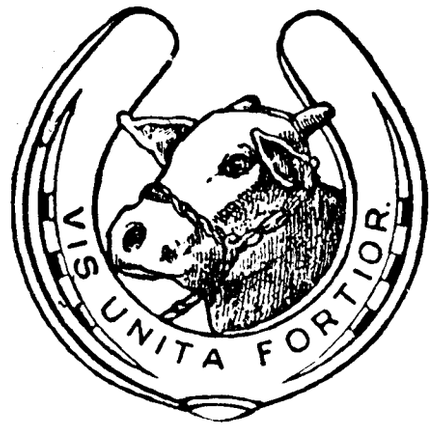
Regd. No. M. 6953

Vol. 38, No. 10 OCTOBER, 1961

THE INDIAN VETERINARY JOURNAL

(The Journal of the Indian Veterinary Association)

A Monthly Record of Veterinary Science



(ESTD. 1924)

OFFICE:

7, FIRST STREET,
VIDYODAYA EAST, T'NAGAR,
MADRAS-17. (S. INDIA)

TEL. No. 88743

BELMIX

Vitamin Supplement for Poultry in powder form.
Easy to mix - can be stored in Feed.
(½ lb. in 100 lbs. of feed)

VITAMIX

Odourless vitamin supplement for Cattle, sheep, pigs and dogs.
(½ – 1 teaspoonful per day)

BELL

Mineral Mixture
Cattle – Poultry.

'BELL' Incubators – Small & Mammoth.

Complete Bell - Deep Litter Out-Fit for Poultry. Includes House, Incubator, Automatic Feed & Water Arrangements, Foster Mothers, Trapnests, Egg Grader, Leg & Wing Bands etc.

'BELL' Balanced Ready Mixed Feed for Cattle & Poultry.

★

Livestock Feed & Equipment Co.,

202, Poonamallee High Road,
MADRAS-29.

Grams : LISFEC. Tel : 62346

NEW ARRIVALS

Polish Make 'VARIMEX' brand

TYPE MBP-2	:	Travelling type Microscope. Magnification 50x to 1500x.
TYPE MB-10	:	Biological Research Microscope with built-in-illumination. Magnification 25x to 1500x with monocular body, 35x to 2150x with binocular body.
TYPE MB-15	:	Biological Research Microscope with built-in-illlumination. Magnification 25x to 1500x with monocular body, 35x to 2250x with binocular body.
TYPE KF	:	Phase Contrast equipment with revolving Condenser to fit MB 10 and MB 15. For examining the specimens without staining.
TYPE MST-130	:	Stereoscopic Microscope. Magnification 4x to 100x. Useful for examination of wool or artificial fibres, for Parasitologists and Zoologists for dissection and examination purposes.
TYPE KF-2	:	Photo electric Colorimeter. For determining the concentration of coloured liquids by comparing them with standard solution of known concentration.

For further particulars please write to :

Cirugia De Lux (Private) Limited

24, Chowringhee Road, CALCUTTA-13. PHONE : 23-5552.

17, Gunbow Street, BOMBAY-1. PHONE : 26-3802.

1/30, Pantheon Road, EGMORE, MADRAS-8. PHONE : 85974.

NOTICE TO CONTRIBUTORS

1. THE INDIAN VETERINARY JOURNAL is intended for the publication of papers on Original work, General and Clinical articles, Abstracts, Reviews, Association News and other cognate matters pertaining to animal health and disease and the progress of Veterinary Science and the profession in general. The Editor, in his work of assessing papers received for publication, is assisted in an honorary capacity by a large number of Scientists working in various parts of India.

2. Papers are accepted for publication on the understanding that they have neither been published before nor are being considered for publication elsewhere.

3. Matter for publication should always be typed and sent in duplicate. The type-scripts should be on one side of the paper only with double spacing and one inch margin on the left side. They should be sent after careful revision and correction and without over-writings. Otherwise they are liable to be not considered.

4. Names of authors should be followed by their academic qualifications. Their official address or otherwise, should also be stated to enable correspondents to communicate with them direct if they so desire.

5. The papers must be concise and not unnecessarily elaborate. To achieve this object extensive summaries of all available literature with numerous references should be avoided, wherever possible. *The bulk of the paper should record the actual work done by the author or authors.* If papers submitted are considered to be of excessive length, they may be returned to the authors for necessary reduction and re-submission. Papers are accepted subject to the right of minor editorial revision, if considered necessary. No reasons will be given in cases of non-acceptance of articles.

6. A copy of the page-proof will be sent to the author, only in cases where it is found necessary and it should be returned without delay, duly corrected. Extensive changes in the matter are not permissible at that stage.

7. Order for extra reprints should be placed at the time of the initial submission of the paper. Otherwise only the usual number of complimentary reprints *viz.* 10 will be sent to each author up to a maximum of thirty, irrespective of the number of authors over three.

8. Drawings and diagrams should be in Indian Ink on stout white drawing paper or on Bristol board.

9. A small number of blocks illustrating articles are normally paid for by the Journal; but the authors may however be required to pay the entire cost of blocks if they are far too many for a single article. Half-tone photographs should be included only when they are found essential and they should be on glossy paper, bringing out the differences clearly.

10. The number and size of tables, charts and plates should be strictly restricted as the cost of publication is mounting up every day. Coloured plates will not be reproduced, except under exceptional circumstances or when the author is willing to bear the entire cost.

11. Publication of group photographs of some news-value to the profession and of individuals will be undertaken only if space permits and the cost of blocks in such cases will be thankfully received from parties concerned.

12. Abbreviations and mode of references to Authors, years and journals should be on the model normally adopted in all international publications.

Note:—We request our Contributors to help us by observing the above rules, and they will then be facilitating early publication of their articles.

Vol. 38 October, 1961 No. 10

THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE INDIAN VETERINARY ASSOCIATION]

PUBLISHED MONTHLY

★

A Monthly Record of Veterinary Science
Devoted to the cause of the
Veterinary Profession

★

EDITOR

Rao Sahib T. VINAYAKA MUDALIAR, G.M.V.C.,

Office:—7, First Street, Vidyodaya East, T'Nagar,
Madras - 17, (S. India)

❋

All communications should be addressed to the Editor.

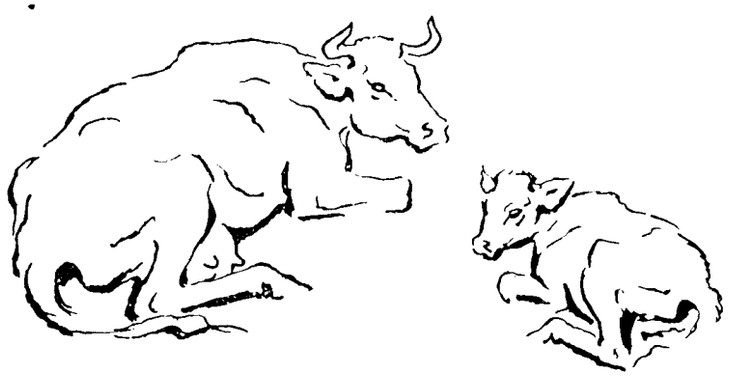
Advertisements should be in the hands of the Editor on or before the 1st of every month.

Subscription payable in advance

Rs. 8.00 per annum to Members of profession.
Rs. 12.00 per annum to Government and all public institutions. Single copy Rs. 2.00.
Foreign: 25sh. per annum. Single copy 3s. 6d.

Members who do not receive the Journal regularly or who find it wrongly addressed are requested to communicate their correct address in block letters to the Editor at once. Non-receipt of a particular issue should be intimated before the close of that month.

VA390-272



'COMPRON'
trade mark brand

Compressed products of sulphanilamide, sulphapyridine and dibromopropamidine isethionate

For SAFETY
after calving and foaling

Post-partum infections of the womb in cows and mares may be effectively combated by the use of 'Compron' brand compressed products of sulphanilamide, sulphapyridine and dibromopropamidine isethionate. The rapid antibacterial activity of sulphanilamide, sustained by the slower but more powerful effect of sulphapyridine ensures a speedy and prolonged action against the organisms likely to cause infection. The antibacterial range of this combination is further increased by the incorporation of dibromopropamidine. 'Compron' may be used as a preventive measure immediately after delivery, and in the treatment of established infections.

Supplied in boxes of 10 products.

VETERINARY PRODUCTS M&B

MANUFACTURED BY
MAY & BAKER LTD

AN **M&B** *brand* VETERINARY PRODUCT

DISTRIBUTORS:
MAY & BAKER (INDIA) PRIVATE LTD • BOMBAY • CALCUTTA • GAUHATI • MADRAS • NEW DELHI

Introducing

BIFURAN

the modern answer to **COCCIDIOSIS**

'Bifuran', an outstanding coccidiostat widely used in the United Kingdom, is now available in India.

It provides you with a new and powerful safeguard against coccidiosis—caecal and intestinal—in chicks, growers and layers of all ages.

Among the many distinct advantages of 'Bifuran' is its effectiveness in both preventive and curative treatment. It is safe and economical in use, and is available in two convenient forms:

'BIFURAN' SUPPLEMENT for mixing with feed;

'BIFURAN' SOLUBLE TABLETS for dissolving in drinking water

...you choose whichever suits the rearing system.

Obtain 'Bifuran' Supplement in packs of 0.5 Kg. or 3 Kg. 'Bifuran' Soluble Tablets in packs of 50 (containing 10 strips of 5 tablets each) from Pharmed Private Limited, Bombay, Delhi, Calcutta, Madras.

SK&F **LIFE-SAVING NITROFURANS**

Advisory literature and further information are available from
Smith Kline & French (India) Ltd.
(Incorporated in England with limited liability)
141 Fort Street, Bombay 1
Ind. Pat. No. 56634/56
'Bifuran' is a trade Mark **BN: PA31 Ind.**

'ROCHE' Synthetic Vitamin A for animal feeds

Experiments carried out the world over have proved that the addition of Vitamin A to feeds has beneficial effects on the growth of livestock. Roche, pioneers and leaders in the synthesis of vitamins, have specially developed Rovimix A for ensuring a regular and good supply of Vitamin A in animal feeds. The growth, development, reproductive ability and general health of your livestock and poultry are better when you add Rovimix to their feeds!

'ROCHE'
—pioneers and leaders in the synthesis of Vitamins

ROCHE PRODUCTS LIMITED, Bombay 1

For detailed information, please write to:

Sole Distributors: VOLTAS VOLTAS LIMITED

Bombay • Calcutta • Madras • New Delhi • Bangalore
Cochin • Kanpur • Secunderabad • Ahmedabad

IWT-VT. 1112

Insist on

"TIMEX"

BRAND

Veterinary Instruments

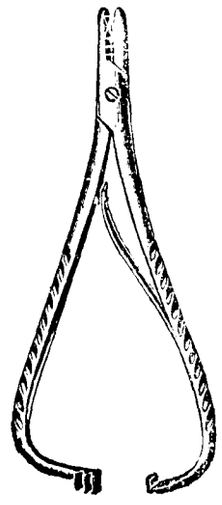
AS

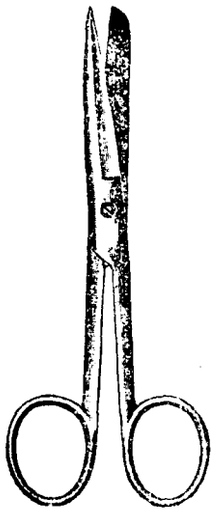
★ These are being manufactured from the finest English Stainless Steel

★ Guarantee for one year is given with each Instrument

★ These are regularly exported to foreign countries

★ These are durable, dependable and cheap





For your requirements please write to :—

TIMES SURGICAL CO.,

P. O. Box 1336,
DELHI - 6.
PHONE : 220702

Opp. Radio Station,
M. I. Road,
JAIPUR (Rajasthan).
PHONE : 4564

Our Assistant Editor

Goes Abroad

Dr. M. S. JAYARAMAN, M.V.SC.,
Assistant Editor, I.V.J.

has been awarded a Nuffield Foundation Dominion Travelling Fellowship to work on "The isolation and typing of *Salmonella* sp. mainly from Poultry" under the guidance of Dr. Joan Taylor of Salmonella Reference Laboratory, Colindale, London.

He has sailed on 9th October 1961.

[*See Editorial*]

THE

Indian Veterinary Journal

(The Journal of the Indian Veterinary Association)

Vol. 38 OCTOBER, 1961 No. 10

Editorial

THE I.V.R.I. UNDER A CLOUD

Our premier Veterinary Research Institute at Mukteswar seems to have fallen on evil days. We were distressed to read an apology from the Editorial Board of the *Journal of Infectious Diseases* in its May-June 1961 issue regarding an article published in its January-February 1961 issue. The article was on 'Studies on Toxoplasmosis' by Mr. P. G. Pande the Director of the I.V.R.I., Mr. P.C. Sekariah and Mr. P.K. Ramachandran of the Division of Pathology and Bacteriology. The apology records that at least five out of the six figures published "were taken from the previously published works of the other authors". It further adds " We offer our sincerest apologies to Dr. Frenkel, to Dr. Lainson, and to the readers of our Journal for our unwitting participation in this regrettable incident ".

This is not only a regrettable incident but a highly disgraceful one where India is concerned. We do not want to comment any further at this stage, as we have requested the Government of India to furnish us with a copy of the report of an enquiry they have instituted in the matter. We shall return to this subject again.

The Indian Veterinary Journal

(The Journal of the Indian Veterinary Association)

Vol. 38 **OCTOBER 1961** **No. 10**

CONTENTS

They Go Abroad

Dr. B. PATNAIK, G.B.V.C., D.V.P.,
Research Officer, Orissa,
has proceeded to Cornell University, U.S.A., for Post-graduate studies in Veterinary Parasitology.

Dr. R. RAJAGOPAL RAO, G.M.V.C., B.V.SC.,
Veterinary College, Tirupathi,
Andhra Pradesh,
has proceeded to Washington State University, U.S.A., for higher studies in Animal Science.

Dr. MD. NASRULLAH KHAN, B.V.SC.,
Animal Husbandry Dept.,
Andhra Pradesh,
has proceeded to Lousiana State University, U.S.A., for specialising in Animal Industry.

OUR ASSISTANT EDITOR

Dr. M. S. Jayaraman, G.M.V.C., B.V.SC., M.V.SC., a member of the staff of the Madras Veterinary College, who was permitted only recently by the benign Government of Madras, to serve as an Assistant Editor of this Journal, has been awarded a Nuffield Foundation Dominion Travelling Fellowship to work on Salmonella species at the Salmonella Reference Laboratory, London, for a period of about one year. This much coveted Fellowship is awarded purely on merit in open competition. We are happy that a member of our staff has been recognised as worthy of this award. This is the second time that a Graduate of the Madras Veterinary College has had the honour of receiving this award. The first one was Dr. O. Sundararama Reddi, B.V.SC., Ph.D., in 1960.

Dr. Jayaraman is a highly painstaking and sincere worker. Patience and perseverance are his great assets. He refuses to be beaten in his work in whatever field he may be working. That is a spirit which is bound to take one a long way to success. He has been a tower of strength to us. He has imbibed the spirit of the I.V.J. which is one of dedicated service. He is of a very quiet disposition and retiring by nature. His love for the profession is really commendable. We are sure he will come back highly benefitted to take up similar advanced work in this country.

Mrs. Jayaraman has been helping her husband in his journalistic work from behind the screen. We are deeply indebted to her as well. She is accompanying her husband. We wish both Dr. and Mrs. Jayaraman, *bon-voyage*, an enjoyable stay in England and safe return!

Ootacamund Municipality

(MADRAS STATE)

Applications are invited from qualified persons who have not attained the age of 32 years in the prescribed form which can be had on payment of Rs. 3/- into the Municipal Treasury with particulars of general and technical educational qualifications, previous experience, age and community and with attested copies of certificates and testimonials for the post of Veterinary Surgeon under the Ootacamund Municipality in the scale of Rs. 200-10-250-15-400 plus allowances so as to reach this Office on or before 15-11-61.

Municipal Office,
Ootacamund,
18—9—61.

G. GNANASAMBANDAM PILLAI,
Commissioner Delegate.

General Articles

SECRETION OF ANDROGEN BY THE OVARY OF THE LAYING PULLETS*

By

B. Panda

Department of Poultry Husbandry University of Maryland, College Park, Maryland, U.S.A.

During the past several years many investigations have been conducted to elucidate the effects of various hormones on growth and development of the secondary sexual characters, particularly, the comb of the chicken. The term "Secondary Sexual Characters" refers to those physical characteristics that are not directly concerned in the reproductive processes but that differ in two sexes and most often are under hormonal control.

The male sex hormone has long been shown to have pronounced effects on the growth, development and turgidity of the capon and chick comb. The comb response furnishes an almost ideal test for the male hormone, since the reaction may be recognized so rapidly and in an external character. Furthermore, the organ is susceptible to accurate measurement and the per cent response in definite time can be calculated easily. In either sex, comb growth occurs in the presence of its own gonad; in the male, this growth is continuous from its inception till the mature state of the organ is achieved. In the female, rapid comb growth occurs coincidently with laying and regression occurs during the inactive period. The data secured from the results of Wilkins (36), Hall (13), and Chaikoff *et al.* (5) show that the ovary and the oviduct regress in weight as well as in size during the non laying periods.

If it is assumed that growth of the comb of the female during laying season is caused by the male hormone secreted by the ovary at this season, then, other positive responses such as: the increase in size and change in histology of the wolffian duct, a higher red blood cell count and partial or complete involution of the bursa of Fabricius should accompany the comb growth at this period, since it has been found that male hormone influences these positive responses (2, 15, 16, 18, 22, 23, 24, 27, 29, 35). An investigation was, therefore, carried out in an attempt to answer several specific questions: (1) If comb growth in the pullet during the laying period is under the control of male

---

* Scientific Article No. A-930, Contribution No. 3286 of the Maryland Agricultural Experiment Station (Department of Poultry Husbandry).

hormone, does the wolffian duct exhibit simultaneously further developments? (2) Do comb growth and/or activation of wolffian duct coincide with an increased red blood cell count and with partial or complete involution of the bursa of Fabricius?

Experimental Procedure

Forty-one single comb White Leghorn pullets 18½ weeks old were used in this study. The comb measurements, body weights and red blood cell counts were taken. Eleven pullets were sacrificed immediately in order to establish the immature state of the wolffian duct. At autopsy, two samples of wolffian ducts from each pullet were taken and fixed in Bouin for histological studies. The Bursa of Fabricius was removed from each bird and weighed. Of the remaining thirty pullets, twelve were kept as control; eighteen were divided into three experimental groups of six each and received the daily graded doses at 0·1 mg., 0·2 mg. and 0·4 mg. testosterone respectively. The testosterone solution used was prepared by dissolving testosterone powder in a mixture of 80 parts of sesame oil and 20 parts of benzyl alcohol making the final strength as 1 mg. per ml. During the experimental period, comb measurements were taken weekly. The pullets belonging to treated and control groups were autopsied when the experimentally induced or the normal comb growth had stabilized. In a preliminary trial, the comb growth was seen to be stabilized when it reached 62 sq. cm. and 68 sq. cm. in area in control and treated groups respectively. The final red blood cell counts and comb measurements were recorded for each pullet just prior to autopsy. The bursa was collected, where present, and weighed. The wolffian duct was collected from each pullet at autopsy, sectioned and studied for histological details.

Results and Discussions

The experimental results detailed in the Tables 1, 2, and 3 furnish adequate data for replies to the questions enumerated in the introduction. The stimulating effects of androgen on the comb growth have been well established (8, 9, 14, 16, 20, 29). The male hormone injected into the pullets during their prepubertal period called forth the most striking and unmistakable precocious growth of the combs. Although the comb growth of the pullets in the control group was striking during this period, the comb of the treated pullets was larger and grew faster than the comb of the control birds. The average final size in the treated pullets was 67·34 sq. cm., while that in the control was 62·78 sq. cm., the difference between the two groups being 4·56 sq. cm.

The comb size has been expressed in sq. cm., the product of the height times the length. The relative measurements for the treated and the control groups are shown in Table 1. The comb measurements for the treated and control group are the final measurements taken just before autopsy when the comb growth had stabilized.

It was interesting to note that pronounced comb growth occurred just prior to laying in the controls. The reason for the rapid and conspicuous growth of the comb of the pullets coming into lay may be interpreted as follows: Differential growth of the body of the birds takes place according to the necessity of an organ or its parts at certain phases of life. Likewise, the secondary sexual characters follow the same trend of increase which is observed in the reproductive organs. The ovary being activated during this period secretes estrogen and in addition, secretes androgen which stimulates the comb.

Administration of androgen caused a definite increase in erythrocyte counts among the treated pullets (Table 1). This is in accord with the observations made by other workers (2, 15, 22, 24, 35). The average erythrocyte count in the treated group was 3·27 millions/cu. mm., while that in the control was 2·78 millions/cu. mm., the difference being 0·49 millions/cu. mm., although the initial difference between these two groups was 0·076 (Table 2). The existence of a sex difference in number of erythrocytes, which is due to androgen, has been observed in numerous animals; among which are domestic fowl (2, 3, 6, 7, 10, 15, 19, 24, 33), pigeon ringdoves (26), mouse (17), rats (1, 25), cats (20), sheep and horses (31), cattle (21), buffalo (30) and humans (38). In each of these species the erythrocyte count of the male is consistently higher than that of the female.

All the pullets in the control group have shown slight increases in the erythrocyte counts as they matured. This increase in red cell count may be due to the androgen secreted by the ovary which stimulates the comb growth as well as the wolffian duct. However, Bloom and Domm (4) stated that estrogen lowers the erythrocyte counts in the fowl by interfering with the erythropoiesis and this seems shared by Domm and Taber (8), although their table 1 (pp. 259) records no difference in erythrocyte count between the normal and bilaterally ovariectomized hen. Furthermore, Newell and Shaffner (22) and Sturkie and Newman (33) showed that estrogen has no effects on the erythrocyte count of the female fowl. Since estrogen does not interfere with the stimulating effects of androgen on the comb growth and activation of the wolffian duct, it is most probable that it does not interfere with the stimulating effects of androgen on the erythropoietic tissue.

Even the slight increase in the erythrocyte count in the control group with simultaneous increase of comb size and development of the wolffian duct contra-indicates estrogen antagonism. Rather, it supports

the view that an androgen secreted by the ovary during this period increases the number of circulating erythrocytes, probably by influencing their production from the erythropoietic tissues.

The bursa of Fabricius showed marked reduction in size in control as well as *treated pullets* ; greater involution was seen in androgen treated than in control birds (Table 1) This observation is in the same line with the views of Glick (11, 12). Further, a higher dose of androgen (0·4 mg.) was more effective in bursa reduction while it produced reverse effects on other characteristics of the treated pullets (*Table* 1). As such, 0·2 mg. of androgen was found to give better overall responses than the other doses (Table 3).

The male sex hormone caused very definite measurable differentiation of the epithelium of the wolffian duct. The secretory activity of the epithelium was increased, the lumen was enlarged, its outline irregular and the smooth muscular layer surrounding the lumen was further developed. This observation has earlier been recorded for young chicks *treated with male sex hormone* (16). The wolffian ducts of the control pullets, which were layers at autopsy, showed well marked histological differentiation. The epithelial cells were much more developed than those of the immature pullets and showed definite secretory activity. The lumen was irregular and the muscular walls were well differentiated. These observations are in agreement with the views of Witschi (37) who has shown that the female wolffian ducts in the wild birds are activated during the breeding season indicating the periodic secretion of an androgen. These characteristic developments in the normal wolffian ducts resembling those of the treated pullets are definite indices of an androgen secretion by the activated ovary at this period.

The wolffian ducts in the immature pullets did not show much differentiation in the epithelium except in four pullets whose ovaries and oviducts were approaching a functional stage but not yet fully developed. Otherwise, the wolffian ducts were found to persist as very narrow tubes with extremely small lumen ; the epithelium remained undifferentiated and the muscular wall undeveloped.

In view of the above results, it seems logical to conclude that, the ovary of the laying pullets secretes an androgen, which, while stimulating and supporting the comb growth in the laying pullets, brings about further development of the wolffian duct, increases the erythrocyte counts, and participates in involution of the bursa of Fabricius. It remains to be determined, whether the androgen secreted by the laying pullet's ovary is chemically and physiologically the same as that of the male. It may prove to be a progestin with some androgenic properties.

Summary

An experiment was conducted to investigate the secretion of androgen by the ovary of the laying pullet. Forty-one pullets, eighteen and half weeks of age were used in this study. Erythrcoyte counts and measurements of head furnishings were made for all. Eleven pullets were then sacrificed at once to establish the histological state of the immature wolffian duct. Three groups of six each were treated with 0·1, 0·2, and 0·4 mg. testosterone respectively. Twelve pullets served as control. Final erythrocyte counts and autopsies were made of each individual pullet when comb size reached the maximum development.

The results show that the male hormone treatment caused activation of the wolffian duct, increased comb size and red blood cell numbers, and reduced the size of the bursa of Fabricius. Similar but lesser changes were observed in the pullets of the control group as they came into egg production. Because of the similarities between the experimental and normal developments, it seems logical to conclude that, the ovary of the mature pullet secretes an androgen, which, while stimulating and supporting the comb growth, simultaneously brings about further fuctional developments of the wolffian duct, increases the red blood cell counts, and participates in the involution of the bursa of Fabricius.

TABLE I

Average Comb Area, Erythrocyte Count Development of Wolffian Duct and Bursa Weight in Immature, Control and Treated Pullets.

	Immature	Control	Treated [1]
Comb Area sq. cm. ...	8·80	62·78	67·34
Erythrocyte Count million/ cu. mm.	2·55 [3]	2·78 [3]	3·27 [2]
Wolffian Duct* ...	0·37	1·91	2·76
Bursa Weight, mg. ...	987·5 [4]	173·64 [4]	85·00 [4]

* Development of Wolffian Duct beyond immature stage has been shown by a score: One plus (+) = 1.

[1] Combined data for 3 levels.

[2] Statistically significant at 1% level.

[3] Statistically significant at 5% level.

[4] Statistically significant at 1% level.

TABLE II

Average Comb Area, Erythrocyte Count of the Control and Treated Groups at the Beginning of the Experiment (all pullets immature).

	Control	Treated	Diff.
Comb Area sq. cm. ...	9·81	10·21	0·48
Erythrocyte Count million/ cu. mm.	2·512	2·618	0·076

TABLE III

Average Comb Area, Erythrocyte Count, Development of Wolffian Duct and Bursa Weight in Different Groups of Androgen Treated Pullets.

	0·1 mg.	0·2 mg.	0·4 mg.
Comb Area sq. cm. ...	68·14	69·88	64·00
Erythrocyte Count millions/ cu. mm.	3·07	3·52	3·21
Wolffian Duct* ...	2·83	2·84	2·61
Bursa Weight, mg. ...	91·67	88·33	75·00

* Development of Wolffian Duct shown by score: One plus (+) = 1.

Acknowledgment

The author is much thankful to Dr. Mary Juhn, Research Professor, Department of Poultry for her kind help and guidance in preparing this manuscript and to Dr. C. S. Shaffner, Professor of Physiology and Head, Department of Poultry, University of Maryland for his keen interest and valuable suggestions.

REFERENCES

1. Adams, A. E. and Shevret, F. ... (1929) *Physiol. Zool.*, **2**, 181–220.
2. Anderson, J. E. Harry, Y. C., Wong Alan, C., Levy, and Abbie, K. Wong (1959) ... *Soc. Exptl. Biol. and Med.*, **102**, 419–421.
3. Blacher, L. J. (1926) ... *Biol. Gen.*, **2**, 435–441.
4. Bloom, W. and Domm, L. V. ... (1941) *Anat. Rec. Suppl.*, **81** (4): 91 (abstract).
5. Chaikoff, I. L., Lorenz, F. W.... and Entenman, C. (1941) *Endocrinal*, **28**, 597–601.
6. Chaudhuri, A. C. (1926) ... *Proc. Roy. Phys. Soc. Edinburgh.* **21**, 109–113.
7. Domm, L. V., Taber, E. and ... Davis, D. E. (1943) *Proc. Soc. Exper. Biol. and Med.*, **52**, 49–50.
8. Domm, L. V. and Taber, E. ... (1946) *Physiol. Zool.* XIX (3), 258–281.

9. Dukes, H. H. (1955) ... The Physio'ogy of Domestic Animals, 7th Ed. Bailliere, Tindall and Cox. London.
10. Forkner, C. E. (1929) ... *Journal Exper. Med.*' **50**, 121–142.
11. Glick, B. (1954) ... *Poultry Sci.*, **33**, 1055 (Abstract).
12. ———— (1956) ... *Poultry Sci.*, **35**, 843–851.
13. Hall, G. O. (1926) ... Diss. Cornell University, Ithaca, New York, p. 76.
14. Houssay, A. B. (1955) ... Human Physiology, McGraw-Hill Book Co., N. Y.
15. Juhn, M. and Domm, L. V. (1930) ... *Amer. Jour. Phys.*, **94**, 655–661.
16. Juhn, M., Gustavson, R. G. and Gallagher, T. F. (1932) ... *J. of Exptl. Zool.*, **64**, 133–185.
17. Kamenoff, R. J. (1937) ... *Proc. Soc. Exper. Biol. and Med.*, **36**, 411–414.
18. Kirkpatrick, C. M. and Andrews, F. M. (1944) ... *Endocrinol.* **34**, 340-345.
19. Landauer, W. and David, L. T. (1933) Folia hemat., **50**, 1–11.
20. Lewis, L. A. (1941) ... Endocrinol, **28**, 821–827.
21. Nambiar, K. T., Gopalkrishnan, L. V. and Govindan Nayar, K. N. (1961) *Ind. Vet. J.* **38 (7)**, 360–365.
22. Nalbandov, A. V. (1958) ... Reproductive Physiology W. H. Freemen and Co., San Francisco.
23. Newell, G. W. and Shaffner, C. S. (1950) ... *Poultry Sci.* **29**, 78–87.
24. Panda, B. (1960) ... *Ind. Vet. J.* **37 (5)**, 240–246.
25. Perk, K. (1958) ... *Refuat Vet.* **15**, 117–19.
26. Reich. C. and Dunning, W. F.... (1948) *Cancer Res.* **3**, 248–257.
27. Riddle, O. (1928) ... *Amer. J. Physiol.* **86**, 243–265.
28. Riddle, O. and Braucher, P. F.... (1934) *Amer. J. Physiol.* **108**, 554–566.
29. Selye, H. (1947) ... Text Book of Endocrinology, U. of Montreal, Montreal, Canada.
30. Simon, K. J. and Annamma Jacob (1961) ... *Ind. Vet. J* **38 (4)**, 183–188.
31. Storch, A. (1901) ... *Physiol.* **176**, 263–284.
32. Sturkie, P. D. (1954) ... Avian Physiology Comstock Publishing Assoc., Ithaca, N. Y.
33. Sturkie, P. D. and Newman, H. J. (1951) ... *Poultry Sci.* **30**, 240–248.
34. Taber, E., Davis, D. E. and Domm. L. V. (1941) ... *Anat. Rec. Suppl.* **81 (4)**, 89 (Abstract)
35. Taber, E. and Domm, L. V. (1943) ... *Ibid.* p. 16 (abstract).
36. Wilkins, R. H. (1915) ... Diss. Cornell University, Ithaca, New York, p. 64.
37. Witschi, E. (1956) ... Development of vertebrates, Saunders Co., Philadelphia.
38. Zoethout, W. D. and Tuttle, W. W. (1958) ... Text book of Physiology, Mobsy Co., St. Louis.

STUDIES ON LAPINISED-AVIANISED RINDERPEST VIRUS
PART II — FIELD TRIALS

By

M. S. Menon

Indian Veterinary Research Institute,
Mukteswar-Kumaon, U.P.

Extensive field trials carried out with lapinised rinderpest vaccine on different breeds of cattle, buffaloes, sheep and goats including European and European Crosses in organized government farms in different parts of the country involving about 30,000 animals, furnished incitive evidence to prove that the lapinised virus was absolutely safe and was capable of conferring a strong immunity lasting for at least a period of 5 years, the longest period tested so far. In spite of all these desirable characters it was found that it would not be possible to produce in India sufficient quantities of this vaccine to cope with the large demand of our country for the mass vaccination of animals against rinderpest in accordance with the eradication scheme.

In the mean time it was seen that majority of plains cattle which possess a certain degree of resistance to rinderpest could be safely vaccinated with the vaccine prepared from the Mukteswar strain of goat adapted virus which has further gone down in its virulence as a result of certain modifications that were introduced in the method of maintenance of this strain. However, this product cannot still be considered suitable for vaccination of highly susceptible animals including pure European breeds, and their crosses, buffaloes sheep and goats for which a milder vaccine is needed. Hence it became necessary to find out the ways and means to explore the possibility of evolving a milder vaccine to protect highly susceptible animals safely, effectively and economically. Lapinised-avianised vaccine was evolved by Nakamura and Miyamoto (1953) to protect Japanese native and Korean cattle against rinderpest as the Lapinised vaccine was found to elicit too severe reactions in these breeds. The first field application of a rabbit passaged strain of the Lapinised-avianised rinderpest virus for vaccination of Korean cattle was reported by Reisinger, *et al* (1954), since the republic of Korea had maintained an immune zone in the area for the purpose of preventing the spread of rinderpest from Manchuria, which was then known to be infected with rinderpest and also from North Korea which was also possibly infected. More than 30,000 cattle were safely vaccinated with rabbit passaged lapinised-avianised virus and no adverse reaction was observed in any vaccinated animals. Complement-fixing and virus-neutralizing antibodies developed to good levels in more than 90% (Nakamura *et al* 1955) of the vaccinated animals. Also more

than 120 Korean calves vaccinated under laboratory conditions and subsequently challenged with bovine rinderpest virus proved to be solidly immune.

The lapinised-avianised virus strain was received in 1955 at the Indian Veterinary Research Institute, Mukteswar when tested in rabbits and hill bulls the virus was found to be viable and potent. It took nearly two months to obtain the necessary laboratory equipment to start the propagation of virus in 12 to 14 day old embryonating eggs. During this period the seed material was stored in the deep freeze cabinet at -20°C. At the start the titre of the virus was found to be 1 : 200 only. After 41 serial passages in 12 to 14 day old embryonating eggs in this laboratory, the titre of the virus rose to 1 : 16,000 in wet form and 1 : 800 in freeze-dried form.

Lapinised-avianised vaccine was found to be very effective in immunising hill cattle in 5 separate trials under laboratory conditions. As such it was felt that it could prove to be ideal product for protecting highly susceptible hill cattle, pure English and Cross bred cattle. But, before this vaccine is employed on a large scale, experimental field trials were carried out on the organised farms in India, where highly susceptible animals are available, in order to study the nature and duration of immunity conferred by the vaccine under field conditions. Accordingly animals in the following farms in India were vaccinated with freeze dried lapinised-avianised virus.

Table I

Name of the farm and place.	Date of vaccination.	No. of animals vaccinated.	Date of challenge.	No. of animals challenged.	Interval in months.	Result.
I. V. R. I. Dairy Mukteswar	11-12-55	12	17-4-56	2	4½	All immune Control animal one reacted and died of Rinderpest.
National Dairy Bangalore	6-3-56	58	2-2-57	6	11	All immune Control animals two severally reacted and recovered.
Peoples Dairy Ernakulam	15-8-56	61	12-2-57	6	11	All immune Control animals two severally reacted and recovered
Cattle Breeding cum Research Station, Haringhatta W. Bengal	24-2-56	50	Could not be challenged as there was an outbreak of rinderpest during January 1957 in this farm.			

Animals were inoculated subcutaneously with freeze dried lapinised-avianised vaccine using 1 ml. of 1 : 100 suspension in normal saline, containing 8 m.i.d. The vaccine after reconstitution, was kept on ice in a container till the operation was over. There was neither thermal nor any other untoward reaction worthy to be recorded in any vaccinated animals.

It will be observed from the table No. I that immunity lasted at least 11 months, upto which only the test had been conducted. At Haringhatta farm, West Bengal no challenge test was run for the reason that there was an outbreak of rinderpest in January 1957. The outbreak was very severe and many healthy animals were involved in it with a certain percentage of mortality from the infected lot. But it was very interesting to note that no animal from the group vaccinated with freeze dried lapinised-avianised vaccine died of rinderpest. This incident had demonstrated the protective value of the lapinised-avianised vaccine during the course of an outbreak of the disease.

In India most of the Dairy farms, private as well as state governed, are maintaining European cross bred animals for milk. These animals are very highly susceptible to rinderpest and as such goat tissue vaccine was found to be too strong to protect these animals from the disease. Before the evolution of Lapinised and "Lapinised-avianised" rinderpest vaccines these hyper-susceptible animals were immunized with goat tissue vaccine and serum. But this kind of vaccination, in addition to the cost of the vaccine and serum, does not confer a long term of immunity. Hence the imperative need for a mild, attenuated live-virus, vaccine. It had already been mentioned in an earlier paper (Dhanda and Menon, 1958) that lapinised-avianised rinderpest virus as a result of regular serial passages had given a titre upto 1 : 64000 which would render vaccine production quite economical. It was estimated that about 300 doses of vaccine in a freeze dried form can be obtained from a single egg, provided that the yolk sac method of inoculation is employed and the whole egg contents are used for vaccine production.

During the early part of 1957, some field trials have been carried out and about 600 animals were vaccinated with the new vaccine and the results of such tests so far indicate that the vaccine is absolutely safe for all species of animals and confers solid immunity as judged by the fact that on challenge with virulent bovine rinderpest-virus the vaccinated animals proved solidly immune, while the controls almost invariably reacted and died of rinderpest. The periodical immunity tests carried out in a few animals out of those vaccinated with freeze dried lapinised-avianised vaccine during the years 1956 and 1957 are presented in table No. II.

TABLE II

Name of the farm and place.	Date of vaccination.	No. of animals vaccinated	Date of challenge.	No. of animals challenged.	Interval in months.	Results.
TISCO Dairy Farm, Jamshedpure	16-11-56	676	17-12-57 Control are reacted and died of R/P	6	13	All immune
I. V. R. I. Dairy Mukteswar	9-9-57	40	11-11-59 Controls two severely reacted and died of R/P	2	26	Both immune
National Dairy Research Institute Bangalore	3-2-57	60	9-3-60 Controls two severely reacted and recovered.	6	36	All immune

It may be seen from the above table that the lapinised-avianised vaccine confers immunity for at least 3 years the maximum period so far tested. Reports have been received from Jamshedpur that there was a severe outbreak of rinderpest in that area in 1958 and many local unvaccinated animals died. The TISCO farm animals which were all vaccinated with freeze dried lapinised-avianised vaccine did not contract the disease in spite of the fact that these animals were exposed to infection in grazing ground adjacent to the farm, where the village cattle used to come for grazing. It was also reported that a few village cattle were found dead in that field. This confirms the previous finding that the animals vaccinated with this vaccine did not contract the disease at Haringhatta farm, West Bengal, in spite of the fact that they had been exposed to rinderpest infection during the outbreak in that farm.

A practical difficulty, worthy of interest, to be recorded here, is that, while conducting the immunity test in vaccinated animals after a period of three years, suitable animals are not available for the test due to the fact that mostly the vaccination is done in animals just over one year and above. During the course of three years either the heifers become cows and are in milk or in advanced pregnancy with the result that it has become very difficult to get animals free from above condition in the organized farms. Among the male calves most of them are broken as bullocks and they are either used for ploughing or carting in the farms or sold in the public auction. Hence only a very limited number of animals were available for immunity test. However, it is hoped that a few animals will be available in the organized farms for challenge periodically, to ascertain the nature and duration of immunity conferred by freeze dried lapinised avianised vaccine.

Field application of lapinised-avianised vaccine during an outbreak of rinderpest :—A outbreak of rinderpest was reported among hill cattle in the villages of Pittoli and Dharmoli in Kumaon hills about 4 to 5 miles from Mukteshwar. It was reported that many animals had died of rinderpest. As freeze dried or lyophilized lapinised-avianised vaccine was not available at that moment in the laboratory, wet vaccine prepared with the viscera harvested from the infected 12 to 14 days embryos was taken on ice in a thermos flask. The village where the outbreak of rinderpest occured is far and without any proper roads excepting a bridal path and a foot path. It took nearly two hours to reach the place, from where the virus material was reconstituted in the ratio of 1 : 100 suspension in normal saline 1 ml. of the suspension was inoculated subcutaneously in each available healthy animal. Altogether 259 animals were protected against rinderpest with this vaccine. After the vaccinations 4 or 5 animals died from the vaccinated group. In all probability these animals were in advanced incubation stage at the time of vaccination. Rest of the animals did not contract the disease and the outbreak was brought under effective control.

Discussion

After the evolution of lapinised-avianised vaccine hyper, susceptible animals in Japan and Korea were safely protected against rinderpest, and the immune response in them was estimated to be 90% as judged by production of complement-fixing and virus-neutralising antibodies. The lapinised rinderpest vaccine which was found to be safe elsewhere for protecting all species of animals against rinderpest was found to be too strong for the Japanese native cattle and Korean cattle.

Lapinised-avianised vaccine was found to be very safe and economical to protect all highly susceptible animals in our country. Periodical immunity tests conducted in a few animals out of those vaccinated with lapinised-avianised vaccine in the organised Govt. farms had shown that the vaccine confers a solid immunity upto 3 years the period upto which only the tests have been carried out so far. This vaccine was also found to be quite safe to be used on a large scale in the face of an outbreak of rinderpest, and the vaccinated animals did not contract the disease with the result the outbreak subsided,

Summary

1. Lapinised-avianised virus strain was received in this laboratory from Tokyo in the year 1955. This strain was cultivated in 12 to 14 days embryonating eggs by intravenous route.

2. At the start the titre of the virus was only 1 : 200 and it was stepped up upto 1 : 1,28,000 by serial passage in 12 to 14 days embryonating eggs.

3. Lapinised-avianised vaccine was used for immunising a few cross bred cattle and hill cattle against rinderpest under laboratory conditions and it was found that it did not provoke any untoward reaction in vaccinated animals.

4. The immunity tests carried out so far have indicated that this vaccine confers a solid immunity upto a period at least 3 years.

5. This vaccine can be safely used for protecting highly susceptible animals for which goat tissue vaccine was found to be too severe.

6. The immunogenic efficacy of Lapinised-avianised virus for vaccinating animals during the course of an outbreak is also recorded.

Acknowledgment

My grateful thanks are due to Shri P. G. Pande, M.Sc., M.R.C.V.S., Director for the encouragement and support and Shri M. R. Dhanda, L.V.P., M.Sc. (Mich.), Dip. Bact. (Lond.) for his able guidance and initiating the work and also to Capt. S. B. V. Rao, and Dr. G. L. Sharma for their kind help to write this paper.

REFERENCES

1. Dhanda, M. R. and Menon, M. S.... (1958) — Rinderpest and its control : Latest position with regard to vaccine employed. *Ind. Vet. J.*, **35**, 214.
2. Nakamura, J., Kishi, S., Kuichi, ... J, and Reisiner, R. (1955) — An Investigation of Antibody response in cattle vaccination with the rabbit passaged IA rinderpest virus in Korea. *Amer, J. Vet. Res.*, **16**, 71.
3. Nakamura, J. and Miyamoto, T. ... (1953) — Avianisation of Lapinised rinderpest virue, *Amer. J. Vet. Res.*, **14**, 307.
4. Reisinger, R. C., Mun, C. P. and ... Lee, N. S. (1954) — Use of Rabbit passaged strain of the Nakamura LA Rinderpest virus for immunising Korean cattle, *Amer. J. Vet. Res.*, **15**, 554.

: *A Masterpiece in Mastitis* :

MASTISIN

Now provides 3 folded attack with

1. MASTISIN ORAL. 2. MASTISIN OINTMENT. 3. PRANAVA.

MASTISIN has now these 3 partners with single aim of FAST AND COMFORTABLE COME - BACK

For detailed literature please write to :

DEEBEE BROTHERS

1706, KHADIA JALOWALI NAKA, AHMEDABAD-1

Telegrams : "INDIGENOUS"

NOTE :—Postal orders must accompany Rs. 3.50 as an advance. Rail route is cheaper for which name the nearest Railway station.

A COMPARATIVE STUDY ON THE EFFECT OF VARYING CONCENTRATIONS OF JUNGMANN'S SOLUTIONS WITH PETROFF'S METHOD FOR ISOLATION OF TUBERCLE BACILLI FROM THE INFECTED ANIMAL TISSUES

By

Shambhu Sharan Mishra, B.V.Sc. & A.H.*

Central Drug Research Institute, Lucknow.

Introduction

The effect of Jungmann's method on the isolation of tubercle bacilli from the tuberculous tissues has not been studied systematically. The isolation of tubercle bacilli carried out by the above method has been compared with the standard Petroff's method to find out whether this method is in any way superior to the latter method with respect to earlier appearance of growth and diminished contamination rate.

Experimental Procedure

Guinea-pigs and mice were infected with the following organisms; *Mycobacterium tuberculosis* var *hominis* strain H37Rv, *Mycobacterium tuberculosis* var *bovis* strain Ravenel, *Mycobacterium tuberculosis* var *hominis* strain H37Rv. D. D. S. Resistant and *Mycobacterium tuberculosis* var *hominis* strain H37Rv isonicotinic acid hydrazone resistant. The dose and route of administration of various strains of tubercle bacilli are given in the Tables I to III.

Spleen, lung, liver or brain were taken out after the death of the animals. 220 mgms. of mouse tissue were homogenized in 1 c.c. of distilled water by grinding the tissue by a pestle over a sterile small copper sieve placed in a mortar. In case of guinea-pigs 500 mgms. of the tissues were homogenized with 1 c.c. of distilled water. The ratio of the tissue to distilled water was kept constant to maintain uniformity in all experiments.

Petroff's method [1] :—The tissues were triturated in a sterile mortar with a pestle and 1 or 2 c.c. of the homogenate was taken in a sterile centrifuge tube. It was then mixed with three times its volume of 4% caustic soda and placed in the incubator at 37°C for thirty minutes, the tube being shaken from time to time. The mixture was then centrifuged at 3000 r.p.m. for thirty minutes and the supernatant was poured off. The deposit was then neutralized with 8% HCl which was added drop by drop, the reaction of the mixture being tested with a drop of

* Demonstrator, Bihar Veterinary College, Patna, On deputation.

phenol red solution. The deposit was inoculated on 3 slants of Lowenstein Jensen medium with a loop of 0·31 mm. diameter.

Jungmann's method :—Two different solutions were prepared, the composition of which are given below.

Solution A.

Ferrous sulphate	— 20 gms.
Conc. H_2SO_4	— 20 ml
Distilled water	— 180 ml

Solution B.

H_2O_2 (20 Vols)	— 5 ml
Distilled water	— 95 ml

Solution A was made in bulk because it keeps indefinitely. Solution B was made up freshly on each occasion.

Experiments were carried out with varying amounts of homogenates (made according to Jungmann's method). In the first series 2 c.c. of the homogenate were taken in a sterile centrifuge tube to which 1·2 ml of Solution A and 1·2 ml of Solution B were added. In the second series 1 c.c. of the homogenate was mixed with 2 c.c. of Solution A and 2 c.c. of Solution B. In the last series 1 c.c. of the homogenate was mixed with 1 c.c. of Solution A and 1 c.c. of Solution B. After mixing the homogenates with varying amounts of Solution A and B, the tubes were shaken for thirty seconds and kept at room temperature for 20 minutes with occasional shakings. The tubes were centrifuged, at 3000 r.p.m. for 30 minutes and the supernatant was discarded. Sterile distilled water was then added to the tubes and the mixture was vigorously shaken before centrifugation. The supernatant fluid was decanted and the deposit was inoculated on to 3 slants of Lowenstein Jensen medium. The same loop was used in Petroff's and Jungmann's methods so that equal quantities of the deposit could be inoculated. The first series of experiments constituted "Jungmann A" method, the second series "Jungmann B" and the last series "Jungmann C" method. The average time of the appearance of growth in all tubes are tabulated according to different Jungmann methods. This is shown in Table I, II and III.

Results

The results of the comparison of three Jungmann's methods with the standard Petroff's method are clear cut. In "Jungmann A" method, the growth appears earlier than Petroff's. In "Jungmann B" method, the growth appears later than Petroff's. In "Jungmann C" method,

the appearance of growth is variable, nearly same by both methods. It would be better to use "Jungmann A" method as it gives earlier growth. Contamination rate is higher in this method but it could be avoided with greater degree of aseptic precautions.

The modification in Petroff's method[2], in Jungmann's method according to Nassau[2] and methods like "Pancreatin — Desogen" of Saxholm[3] have not been dealt here but will form the subject matter of a future communication. Further work is in progress in this direction.

Summary

Various modifications of Jungmann's method have been compared with a standard Petroff's method for cultivation of tubercle bacilli from the infected tissues of animals. Only in one modification of the Jungmann's method did growth appear earlier than the Petroff's method. Contamination was more in Jungmann's method.

TABLE I

The effect of "Jungmann A" method compared with Petroff's method.

No. of sample	Type of infection	Amount of inoculum of tubercle bacilli	Route of infection	Tissues	Days of infection	Average time of growth in Petroff's method in days	Averag time o growth Jung-mann's metho in day
1	H 37 Rv	0·1 mgm. moist weight	Intra peri-toneal	Spleen	47	14	12
2	do	do	Intra cerebral	Brain and spleen	21	13	9
3	do	do	do	Brain	12	14	9
4	H 37 R.D.D.S. Res.	do	do	Brain and spleen	20	18	14
5	do	do	do	do	26	16	14
6	Ravenel	do	do	Lung	17	16	11
7	do	do	Intra cardiac	Spleen	17	20	14

TABLE II

The effect of "Jungmann B" method compared with Petroff's method.

No. of sample	Type of infection	Amount of inoculum of tubercle bacilli	Route of infection	Tissues	Days of infection	Average time of growth in Petroff's method in days	Average time of growth in Jung-mann B method in days
1	H 37 R.D.D.S. Res.	0·1 mgm moist weight	Intra-cerebral	Lung & Brain	35	11	18
2	H 37 Rv	do	do	do	39	14	22
3	H 37 R.D.D.S. Res.	do	do	do	40	15	30
4	H 37 Rv	do	do	Lung	43	23	36
5	H 37 Rv	do	do	do	42	15	18
6	H 37 R.D.D.S. Res.	do	do	Lung & Spleen	45	11	27
7	H 37 RP 1/500 Hyd. Res.	do	Intra-xiphoid	Lymph gland	77	31	40
8	H 37 Rv	do	Intra-cerebral	Lung	48	12	18
9	H 37 Rv	do	do	do	49	11	15
10	H 37 Rv	do	do	Spleen	75	17	37
11	H 37 Rv	do	do	Spleen	78	37	42

TABLE III

The effect of "Jungmann C" method compared with Petroff's method.

No. of sample	Type of infection	Amount of inoculum of tubercle bacilli	Route of infection	Tissues	Days of infection	Average time of growth in Petroff's method in days	Average time of growth in Jung-mann C method in days
1	H 37 Rv	1·0 mgm. moist weight	Supra-pubic injection	Spleen	80	19	23
2	do	do	do	do	75	26	28
3	do	do	do	Lung	75	23	22
4	do	do	do	Liver	75	20	17
5	do	do	do	Spleen	75	20	19
6	do	do	do	Liver	80	20	18
7	do	do	do	Spleen	80	20	21
8	do	do	Mid abdo-minal	Lung	60	13	15
9	do	do	Supra-pubic	Spleen	78	26	20
10	do	do	do	Lung and Spleen	78	21	22

Acknowledgment

Thanks are due to Dr. B. Mukerji, Director, Central Drug Research Institute and Dr. B. K. Bhattacharya, Assistant Director, Chemotherapy Division for their keen interest in this work. I am particularly grateful to Dr. S. K. Gupta for his guidance during this investigation. Thanks are due to Messrs S. K. Chakravarti, S. N. Misra and Gopalji for their technical assistance.

REFERENCES

1. Mackie and McCartney (1953) ... A hand book of Practical bacteriology.
2. ——————————— (1960) ... *Ibid.*
3. Rolf Saxholm (1958) ... An experimental investigation of methods for the cultivation of *Mycobacterium tuberculosis* from sputum (Oslo University Press).

CONTAGIOUS PUSTULAR DERMATITIS AND SOME OF ITS INFECTIVE AND IMMUNOLOGICAL ASPECTS

By

M. M. Mundu, G.B.V.C., A.V.I.O. (Weybridge)
and
Krishna Mohan, B.V.Sc. & A.H. (Pat.)
Livestock Research Station, Bihar, Patna.

Introduction

The Contagious Pustular Dermatitis is an acute fatal viral disease of sheep and goats. This disease was often being confused with sheep and goat pox clinically. In India, Haddow and Idnani (1946) investigated the disease and considered it as a separate entity quite unrelated either with goat or sheep pox.

C.P.D. is known to occur in many parts of Bihar, during September to February, in a sporadic form, affecting sheep and goats of all ages, the young ones being more susceptible. This work concerns the outbreaks of C.P.D. among sheep and goats in Dumraon, Gaya and Patna farms. In these outbreaks several animals were affected with acute and sub-acute forms of the disease. The object of the study is to elucidate the various aspects of the disease *viz.*, infectivity of the virus, its relation with sheep and goat pox, adaptability to various laboratory animals and vaccination trials with formalised virus.

Review of Literature

The disease has been reported from various parts of the world. In India, Haddow and Idnani (1946) reported it as a separate viral

disease of goats characterised by fever, cough, stringy coat followed by small circular elevated nodular eruptions on the skin, lips, eyelids, tongue etc. with terminal complications of pneumonia generally resulting in death. Marrone (1948) described an outbreak of the disease in goats and assumed the possibility of the disease being caused by two different viruses in sheep and goats on the basis of the normal sheep remaining healthy when kept in close association with infected goats. He claims to have adapted the virus in rabbits but failed to do so in dogs. Rottgrdt *et al* (1951) have reported peculiar behaviour of the virus in sheep, when inoculated in the region of the thorax and abdomen which produced in addition to the normal lesions, extensive oedema. This type of lesion is a very suitable source for collection of material for preparing vaccine. Scabs from infected animals dessicated over sulphuric acid retained their virulence for more than 14 years. Mortelanans *et al* (1953) have reported successful therepeutic trial treatment of infected goats and sheep with penicillin. They have further said that penicillin can help even in cases complicated with stomatitis and enteritis. Plowright *et al* (1959) have cultivated an English strain of C.P.D. virus in monolayer cultures derived from lamb and calf testes and ovine, bovine and caprine embryonic kidneys. The behaviour of this virus was described as very similar to mammalian pox viruses. Manley (1934) has described the tests carried on sheep with desiccated Viruses of English, Australian and Cyprus origin. He contended that the ovine strain was capable of elucidating reaction up to a dilution of 1 in 10,000 whereas caprine strain only up to 1 in 1,000. Sheep infected by scarification of the thigh could resist re-infection but the immunity was not absolute. Hudson (1931) has described an outbreak of the disease in Kenya and successful transmission to healthy sheep. Peres (1932) has described successfu. vaccination trials with a suspension of powdered scabs in 50% glycerol The vaccination was done by scarification in the inguinal region and the immunity has been claimed to last for one year. Hart *et al* (1949) have described the disease in New South Wales. They have shown that the virus can pass through collodian membrane A.P.D. 700 m.μ. The virus has failed to grow on developing chick embryo. The virus can survive at room temperature for 15 years. Satisfactory vaccination of 50,000 sheep has been reported by them. Abdussalam (1957) has reported artificial infection of rabbits with massive doses of C.P.D. virus by scarification method. According to him the infection can be serially transferred but rabbits owing to their lower susceptibility than sheep are not suitable as test animals. Guineapigs and mice are not susceptible. The Virus causes mild lesions in chorio-allantois of 9-12 days chick embryo. The lesions regress continually during serial passage in 12 day old eggs and disappears by about the 4th generation. Recovery from the experimental disease is followed by a partial

resistance to re-infection which disappears in about 50 days in rabbits. Nomland (1940) has reported human infection, with the virus.

History of the Outbreak

The first report of the disease was received from Dumraon in the year 1957. It was a mild form of outbreak affecting 20 to 25 goats. There was no mortality. There after successive reports of the incidence of the disease were being received from Gaya, Sasaram and Daltonganj area during the years 1959-60. The most virulent form of outbreak encountered was at Patna in the year 1959 in which 60 sheep and 6 goats suffered simultaneously. Both the species manifested similar clinical symptoms of the disease which was characterised by dullness, fever, rough and staring coat followed by small nodular eruptions invariably around the mouth, lips, on the skin and sometimes on the upper dental pad and other parts of the body. Mortality was about 2% and all the cases became complicated with pneumonia.

Material and Method

(1) Etherised crusts collected from different outbreaks were used ; hitherto called the field virus in the present experiment. The virus was preserved in 50% buffered glycerin saline at 4°C. Standard methods of preparation of the virus for experimental purposes were being followed *e.g.*, addition of antibiotics and light centifugation (1500 R.P.M.)

(2) C.P.D. virus of known strain procured from I.V.R.I. (preserved in 50% glycerin saline) were used.

(3) For the purpose of cross-immunity tests sheep & goat pox vaccine and virulent virus I.V.R.I. were used.

(4) For all the biological tests healthy kids 6 months to 1 yr. old were used. Albino goats were preferred.

(5) For all purposes of infection and challenge a virus suspension of 10^{-2} dilution was used.

(6) Route selected for infection was always skin scarification except where mentioned otherwise.

Infectivity and Cross-Immunity Tests in Goats

(1) The material collected from the natural cases was highly infective to goats. The infective titre of the virus was found to be as high as 10^{-4}.

(2) The test carried out revealed that the field virus and the I.V.R.I., C.P.D. virus were immunologically identical and the immunity conferred against each other was absolute.

1963

(3) The virus of C.P.D. (field) and sheep and goat pox I.V.R.I. were heterologous.

(4) It may, however, be said tentatively that the sheep and goat pox vaccine of I.V.R.I. conferred some degree of immunity against C.P.D.

The details are given in the Table No. 1.

Adaptability in Laboratory Animals :—Rabbits, guineapigs and mice were selected for the purpose. A comparison of the reaction in rabbits infected under ether anaesthesia and normal condition were made. Reaction in both the cases were alike hence the use of anaesthesia was dropped.

Route of Infection :—For the purpose of passage of the virus in rabbits scarification of the abdomen was made and 10^{-2} dilution of the virus was applied. It was successful in rabbits but the method failed to give a tangible result in guineapigs and mice. Intradermal inoculation of 0·1 m.l. of 10^{-2} dilution of the virus (suspension in Ringer's solution) at different points over the abdomen in rabbits, guineapigs and mice could elicit no reaction except slight hyperaemia at the point of inoculation which subsided within 36 hrs. Intravenous injection of 5 m.l. and m.l. (10^{-2}) in rabbits and kids respectively could not induce either local or general reaction.

Scarification Method in Rabbits :—12 successive passages of the field virus in rabbits were made. Whole infected skin lesion was collected (measuring about 2 sq. inch) and used as a source of virus for the successive passage. Upto 5th passage the rabbits used to be sacrificed 96 hrs. after infection which was supposed to be the peak period of reaction. There were neither systemic disturbances during life nor any postmortem lesions were met with after death. Clinical features were erytherymatous swelling with oedema and proliferation of epithelial cells, Later on the area used to turn brownish and thickened due to exudation of lymph. No vescicle or pustule formation was observed. There was no marked thermal reaction.

Infection of Kids with Rabbits adapted virus :—Infected rabbit skin of 5th and 10th passage (preserved in buffered 50% glycerin saline at 4°C. were inoculated (10^{-2}) dilution in healthy kids to ascertain the presence of potent virus in rabbit skin lesion and its immunising power, if any. The kids were subsequently *i.e.*, after one month challenged with virulent test virus as well as healthy control. From the results of the above experiments (Table II and III) it was concluded that the rabbit adapted virus produced only a slight reaction in the goats and this could not protect them when challenged with the virulent virus.

KZm2.N29
N61·38·10

TABLE I

Experiment No. 1—C.P.D. (I.V.R.I.) vs. C.P.D. virus (Field).

Group No.	Date and material for primary infection	Reactions observed after primary infection	Date and material for challenge	Reaction observed after challenge	Inference
1	Infected with C.P.D. virus of I.V.R.I. (1 in 100) on 12-2-58	6th day eruptions, Vesicles on 10th day. Encrustations from 13th day. Temperature between 105° to 106·6°F. The goats recovered, Catarrhal discharge from nostrils +	Challenged with C.P.D. virus (field) on 11-3-58	The goats reacted very slightly. Few nodular eruptions appeared at the site of inoculation. No vesicle or Pustules —	C.P.D. virus I.V.R.I. and C.P.D. virus (field) were identical and the former protected re-infection with the latter
2			do (control)	Numerous eruptions on 6th day, pustules on 9th day encrustation complete on 13th day +	

Experiment No. 2—C.P.D. (Field) vs. C.P.D. (I.V.R I.).

1	Infected with C.P.D. (Field) on 12-2-58	Eruptions on 6th day, vesicle on 8th day, complete encrustation by 13th day. Catarrhal discharge from nostrils +	Challenged with C.P.D. virus (I.V.R.I.) on 11-3-58	Very mild reaction. No erruptions. Temperature upto 105°F —	C.P.D. virus (field) and C.P.D. virus I.V.R.I. were identical
2			do Control	Reactions identical like group No. 1 infected on 12-2-58. Severity more ++	

Experiment No. 3—Goat pox vaccine vs. C.P.D. (Field).

1	Vaccinated with goat pox vaccine (I.V.R.I.) on 12-2-58	Papule, vesicle and pustule at the site. No other complications +	Challenged with C.P.D. virus (field) on 11-3-58	No eruption at the site —	
2	Control		Infected with C.P.D. virus on 11-3-58	Reaction just like group No. 1 infected on 12-2-58 in experiment No. 1 +	Goat pox vaccine afforded some protection against C.P.D. virus (field)

Experiment No. 4—C.P.D. virus (Field) vs. Goat pox virus (I.V.R.I.).

1	Infected with C.P.D. virus (field) on 17-1-58	Numerous eruptions. Temperature upto 105°F. Secondary lesions on the scrotum ++	Challenged with goat pox virus I.V.R.1. on 24-2-58	No reactions. No erruptions —	Inconclusive as no reaction was observed in control
2	Control		Infected with goat pox virus I.V.R.I. on 24-2-58	No reaction —	

Experiment No. 5—Goat pox virus vs. C.P.D. virus (Field).

1 (2 kids)	Infected with goat pox virus I.V.R.I. on 12-2-58	Vesicles on 11th day. Pneumonic sypmtoms. Temperature 106°F +	Challenged with C.P.D. virus (field) on 11-3-58	Numerous eruptions. Slight catarrhal discharge from nostrils +	
2	(Control)		Infected as above	Reaction just like the two test animals infected on 12-2-58 +	The two viruses are immunologically heterologous

Use of Formalised virus as an Immunising Agent :—An attempt was made to test the efficacy of formalised virus as a source of immunising agent. For this purpose 1 in 100 suspension in normal saline solution of the virulent field virus was made and formalised (the final concentration of the formalin being 1%). The material was kept at 7°C for 24 and 48 hrs. for inactivation and thereafter used as a vaccine. 4 Kids were inoculated with the material on the under surface of the tail by scarification method and after a month all were challenged with a test dose of virulent virus keeping two healthy kids as controls. Formalised virus afforded protection to all the goats when challenged. (Vide Table No. III)

Duration of Immunity in Artificially Infected Goats:—The Duration of immunity in a small group of artificially infected animals (kids) was tested. The immunity was absolute till a period of 8 months after recovery.

Histopathology of the Infected Rabbit Skin :—Histopathological examinations of the rabbit skin of 1st to 9th passage was done. The skin was obtained between 72 to 96 hrs. after infection. The changes noticed were thickening of the epidermis with proliferation and swelling of the epithelial cells. There was cellular degeneration in the malphigian layer showing smaller sized and at places fragmented nuclei, In the coreum there was congestion and certain amount of haemorrhage in the isolated areas. There was vacuolation in between the connective tissue layers due to accumulation of inflammatory exudate thus bringing about the over stretching of the connective tissue layers in the coreum. No inclusion bodies could be observed.

Summary

(1) The above experiments revealed that the C.P.D. virus collected from outbreaks in Bihar was immunologically identical with that of I.V.R.I. and the immnity conferred against each other was absolute. The field virus could infect up to a dilution of 10^{-4}. Artificially infected goats possessed an absolute immunity till 8 months. The virus was filterable through Sietz Filter EK.

(2) The viruses of C.P.D. (field) and sheep and goat pox (I.V.R.I.) were heterlogous.

(3) It may be said tentatively on the basis of the very limited experiment that sheep and goat pox vaccine (I.V.R.I.) could afford some degree of protection against C.P.D. (field).

(4) The rabbits could not be infected by intravenous and intradermal routes and so were the guineapigs, mice and goats.

TABLE II

Experiment No. 6—Infected Rabbit skin vs. C.P.D. virus (Field).

Group No.	Date, technique and materials of infection	Local lesion and general disturbances	Date, technique and materials of challenge	Local lesions or general disturbances	Inference
1 (4 kids)	Infected on 24-6-59 with rabbit skin of 5th passage	No local lesion except slight transient hyperaemia (± ful)	Challenged with C.P.D. virus field on 25-7-59	Erythematous swelling followed by pustule etc. +	Kids took up the virus of C.P.D.
2	do with rabbit skin of 10th passage	do	do	do	do
3	Control	Intake of virus doubtful	do	do	do

(5) It could not be established beyond doubt that rabbits can be infected by skin sacrification method with the C.P.D. virus.

(6) Skin sacrification method failed to infect mice and guineapigs.

(7) The material collected from the rabbit skin lesions could not induce infection in kids nor could it protect them when challenged after a month. On this basis it may be concluded that the virus lost its infectivity for goats completely.

(8) Results obtained with the formalised virus as a source of immunising agent appear to be encouraging.

(9) Though Marrone (1948) as already mentioned has assumed the possibility of the disease being caused by two different viruses in goats and sheep, but in our observations, we have found that in a common herd at Patna, both sheep and goats were equally affected in the same outbreak of C.P.D. It may be of interest to mention that during the course of our investigations, the Research Assistant and one Laboratory Attendant accidentally got the infection and the lesions were on their hands and around the neck which confirms the finding of Nomland (1940) as already reported earlier.

TABLE III

Experiment No. 7—Vaccination trial with formalised virus of C.P.D.

Group No.	Date, technique and materials of infection	Local lesion and general disturbances	Inference	Date, technique and materials of challenge	Local lesions or general disturbances	Inference
1	Vaccinated with 1 in 100 of 1% formalised virus inactivated for 24 hrs, at 37°C	Small papules appeared followed by pustules etc. at the site	++	Virulent C.P.D. virus on 25-7-59	Small papules and pustules very scanty	Formalised virus afforded protection against C.P.D. virus field
2	As above after 48 hrs. of in-activation	As above	+	do	As above	
3				Control	Lesions around and at the site of scarification. Secondary lesions on the scrotum	++

Acknowledgment

Our thanks are due Sri V. R. Rajagopalan, Director, Livestock Research Station, Bihar, Patna (at present, Director, Livestock Researches, Bihar) for extending facilities to conduct the experiments. We gratefully acknowledge the help given by the Director, I.V.R.I. in providing us with the C.P.D, and pox viruses and the corresponding vaccines. We are also grateful to Prof. P. B. Kuppuswamy, Head of Pathology and Bacteriology Section for his help in guiding us in compiling the article.

REFERENCES

1. Abdussalam, M. (1957) ... C.P.D, experimental infection. *J. Comp. Path.*, **67**, 305.
2. ——————— ... C.P.D. Pathological Histology. *J. Comp. Path.*, **67**, 207.
3. Fastier, L. B. (1957) ... Human infection with viruses of ovine, C.P.D. *N.Z. Med. J.*, **56**, 171.
4. Haddow, J. R. and Idnani, J. A. (1946) ... Goat dermatitis a new virus disease of Goats in India. *Ind. J. Vet. Sci.*, **16**, 181.
5. Hart, L., Hayston, J. T. and Keast, J. C. (1949) ... Observation on C.P.D. of sheep. *Aust. Vet. J.*, **25**, 40.
6. Hudson, J. R. (1931) ... C.P.D. of Sheep. *Vet. Bull.*, **3**, 27.
7. Manley, E. H. (1934) ... Observations on the virus of C.P.D. *Vet. J.*, **90**, 80.

8. Marrone, P. (1948) ... Contagious ecthyma in goats. *Nuova. Vet.*, **24**, 376.
9. Nomland, R. (1940) ... Human infection with ecthyma Contagiam a virus disorder of sheep. *Vet. Bull.*, **12**, 152.
10. Onman, A. F. S. (1941) ... A note on C.P.D. *Aust. Vet. J.*, **17**, 106.
11. Peres (1932) ... C.P.D. of Sheep. *Vet. Bull.*, **3**, 305.
12. Plowright, W., Witcomb, M. A. and Ferres, R. D. (1959) ... Studies with strain of C.P.D. virus in tissue culture. *Vet. Bull.*, **30**, 22.
13. Rottgardt, A. D. and Garcia Pirazzi, A. J. (1951) ... Contagious pustular, dermatitis in sheep. *Rev. Med. Vet. B. Aires*, **33**, 251.

THE EFFECT OF GLYCEROL LEVELS AND EQUILIBRATION TIME OF FREEZING ON SURVIVAL OF BOVINE SPERMATOZOA AFTER STORAGE AT -79°C.

By

K. J. Eapen,
Indian Veterinary Research Institute,
Izatnagar, U.P.

A recent development in artificial insemination of cattle has been the introduction of various milk preparations as semen dilutors *viz.* boiled homogenized milk, boiled skim milk, heated pasteurized milk, canned skim milk and several others. Thacker and Almquist (1953 a) found boiled homogenized milk or pasteurized milk is as good as egg yolk in motility. But they found motility poor in unboiled milk. Same authors also found boiled skim milk or boiled pasteurized whole milk gave equally good result compared to egg yolk citrate as a semen diluent. Almquist and Thacker (1952) obtained good spermatozoal survival when milk was heated to 92°C for 1–10 minutes. Perkins (1955) observed when homogenized milk was heated to 97°C for ten minutes compared to egg yolk citrate found no significant difference in 60–90 day non return, between the two diluents. The object of the study was to ascertain the effect of glycerol levels and equilibration time of freezing on survival of bovine spermatozoa when heated homogenized milk is used as a semen diluent.

Materials and Methods

The research material consisted of five Jersey bulls regularly used for artificial breediug maintained by the Dairy and Animal Husbandry Department, Oregon State Universiay, Corvallis, Oregon. Immediately after semen was collected, sample was evaluated microscopically for

progressive motility and rate of motility. Soon after collection semen was extended at 38°C with homogenized milk, heated to 92°C for ten minutes kept ready for the purpose to give a concentration of 20 million spermatozoa per milliliter. The partially extended semen wae allowed to cool slowly to 5°C and an equal volume of glycerol fraction at 5°C was added in three equal instalments at an interval of half an hour to get the desired glycerol level and sperm concentration of 10 million spermatozoa per milliliter of diluted semen. This is transferred to 1 cc pyre glass vials which were sealed immediately. Freezing was done with isopropyl alcohol and chipped dry ice. The rate of freezing was 2°C per minute from 5°C to – 20°C and after that, rate of freezing was as rapid as possible by putting powdered dry ice in the bath till the temperature was reduced to –79°C. Semen thus frozen was held for seven days in a vacum flask with dry ice and alcohol in a deep freeze. After seven days of storage frozen semen was removed and dropped in a water bath at 37°C. Samples were evaluated for rate of motility and differential staining slides made. The glycerol levels used in the study were 0, 7, 10 and 15 percent and equilibration time of 0, 6, 12 and 18 hours respectively. Semen of only superior quality was used throughout the experiment. Motility ratings were made on 0 to 10 scale.

Results

The motility ratings and live spermatozoa by differential staining technique obtained in each treatment after a seven day storage period were subjected to statistical analysis and results given in Table III and IV. Mean motility ratings and mean percent of live spermatozoa by differential staining after a storage of seven days at –79°C are given in Tables I and II.

Table I

Mean motility rating of diluted semen after freezing and storage at –79°C (Average of 12 semen samples).

	Equilibration 0 hours	Equilibration 6 hours	Equilibration 12 hours	Equilibration 18 hours
Glycerol 0% ...	0	0	0	0
Glycerol 7% ...	6·3	7·0	7·2	7·3
Glycerol 10% ...	6·0	6·5	6·4	6·5
Glycerol 15% ...	4·0	4·2	4·0	4·4

TABLE II

Mean percent of live spermatozoa by differential staining after freezing and storage at −79°C (Average of 12 semen samples).

	Equilibration 0 hours	Equilibration 6 hours	Equilibration 12 hours	Equilibration 18 hours
Glycerol 0% ...	0	0	0	0
Glycerol 7% ...	42	45	48	47
Glycerol 10% ...	41	43	43	41
Glycerol 15% ...	27	27	27	24

TABLE III

Analysis of variance (Motility rating).

Source	d.f.	M.S.	F. ratio
E ...	3	1·40	1·37
G ...	3	4·83	4·73**
R ...	11	1·56	1·53
E x G ...	9	1·37	1·34
E x R ...	33	1·28	1·25
G x R ...	33	1·59	1·56
Error ...	99	1·02	
	191		

TABLE IV

Analysis of variance (Differential staining).

Source	d.f.	M.S.	F. ratio
E ...	3	5·20	1·24
G ...	3	16·80	4·00**
R ...	11	18·68	4·44**
E x G ...	9	5·32	1·26
E x R ...	33	6·27	1·50
G x R ...	33	4·63	1·10
Error ...	99	4·20	
	191		

Analysis as given in Tables III and IV clearly shows that glycerol level is highly significant in the case of motility rating and differential staining after freezing and storage. Analysis also shows that there is no inter-action between glycerol level and equilibration time which also indicates that percentage of glycerol is an important factor in freezing of semen. As stated earlier equilibration time has little or no importance as far as freezing and storage of semen is concerned. In order to ascertain which level of glycerol is best when motility rating and differential staining are considered as criteria for semen quality, critical difference was worked out. From the critical difference it was found that 7% and 10%, glycerol levels are equally good and 15% and 0% glycerol levels significantly different at 1% level compared to glycerol levels of 7% and 10%. But when differential staining was considered as a criterion, critical difference indicated that glycerol level of 7% to be the best and 10%, 15% and 0% significantly different at 1% level, the order being, 7%, 10% and 0%. The obviously poor result obtained by differential staining is partially due to interference of glycerol in differential staining of spermatozoa as observed by Mixner (1954).

Acknowledgment

This study was completed at Oregon State University while author was working as a Graduate Research fellow, Department of Animal Husbandry. Author is grateful to the Oregon Agricultural Experiment Station for financial assistance and to Professors, Mckenzie and Wu for guidance and suggestions.

Summary

In a factorial design experiment with four levels of glycerol (0%, 7%, 10% and 15%) and four equilibration time (0, 6, 12, and 18 hours) when frozen and stored for seven days at −79°C, glycerol level of 7% and 10% maintained maximum motility compared to other levels. The decrease was significant at 1% when glycerol level was 15%. In the same experiment when differential staining was used as a criterion for quality, glycerol level of 7% was found best and a difference significant at 1% level when glycerol was 10%, 15% and 0%. In both cases equilibration time had little or no effect on motility rating and differential staining after freezing and storage at −79°C.

REFERENCES

Almquist, J. O. and Thacker, D. L. (1952) ... *Abstr. J. Ani. Sci.*, **11**, 787.
Blackshaw, A. W. (1960) ... *Austr. Vet. J.*, **36**, 432.
Cragle, R. G. *et al* (1955) ... *J. Dairy Sci.*, **38**, 508.
Mixner, J. P. and Saroff, J. (1954) ... *Ibid*, **37**, 1094.
Polge. C. and Parkes, A. S. (1952) ... *Ani. Breed. Abstr.*, **20**, 1.
Perkins, J. R. *et al* (1955) ... *J. Dairy. Sci.*, **38**, 155.
Saroff, J. and Mixner, J. P. (1955) ... *Ibid*, **38**, 292.

Snedecor, G. W. (1956) ... Statistical Methods, 5th edition, Iowa State College Press, Ames.

Thacker, D. L. and Almquist, J. O. (1953 a) ... *J. Dairy. Sci.*, **36**, 173.

Thacker, D. L. and Almquist, J. O. (1953 b) ... *J. Ani. Sci. Abstr.*, **10**, 1082.

Van Denmark, N. L. *et al*, (1957) ... University of Illionis, Agricultural Experiment Station, Bulletin, 521.

NUTRITIVE VALUE OF THE COMMON CARP, *LABEC FIMBRIATUS* (Block)

By

S. Annamalay,

Department of Zoology, Annamalai University, Annamalainagar.

Introduction

Fish is one of the most important articles in the daily diet of a great bulk of Indian population. It is by far the best source of mineral matters like Calcium, phosphorus, magnesium, copper etc. Many workers in this country have carried out studies relating to the nutritive value of the common fishes of India (Basu and De, 1938, 1938a; Saha and Guha, 1939, 1940; Mitra and Mitra, 1941; Niyogi *et al.*, 1941; Appanna and Devadata, 1942; Khorana *et al.*, 1943; Setna *et al.*, 1944; and Chari, 1948). A similar study has been undertaken here with reference to the common carp, *Labeo fimbriatus* (Block) which is locally available in abundance in the ponds.

Material and Methods

Specimens of Labeo fimbriatus were collected from the local ponds in the vicinity of Annamalainagar. The method of sampling followed was the one described by the Association of Official Agricultural Chemists (1945).

The moisture content was determined by drying a weighed sample of the minced pulp to a constant weight in a steam oven at 100°C. Estimation of ash was done by the Stolte's dry ashing method as applied by Tisdal & Kramer (1921). The protein was estimated by multiplying the percentage of nitrogen as determined by the Kjeldahl method by the factor 6.025 (Nottingham, 1952). Iron content was estimated by the Elvehjem (1930) and Kennedy (1927) method. Estimation of phosphorus was made by the ammonium molybdate volumetric method (Burns and Henderson, 1935). Calcium content was determined by the McCrudden's permanganate method (1911). Fat was estimated by extracting the dried sample with pure anhydrous ethyl ether for about 12 to 16 hours in a Soxhlet apparatus.

Observations and Results

The results are given in Table I. A comparision of the results obtained here with those of Saha and Guha (1939), vide Table 2, will show that there are wide variations in almost all the values of the chemicals estimated for the different species of this fish.

TABLE I

Chemical composition of the Muscle of Labeo fimbriatus.

Chemical contents		gms./100 gms. wet tissue
Moisture	...	81·1
Ash	...	1·9
Total Nitrogen	...	1·4
Protein	...	8·4
Fat	...	4·8
Calcium	...	0·45
Iron	...	1·8
Phosphorus	...	0·13

TABLE II

Chemical composition of the muscle of Labeo fimbriatus compared with other species of Labeo

Chemical contents		gms./100 gms. of wet tissue		
		Labeo *fimbriatus* (author)	Labeo *rohita* (Saha & Guha)	Labeo *calbasu* (Saha & Guha)
Moisture	...	81·1	76·7	81·0
Ash	...	1·9	0·9	1·0
Protein	...	8·4	16·6	14·7
Fat	...	4·8	1·4	1·0
Calcium	...	0·45	0·68	0·32
Iron	...	1·8	0·85	0·83
Phosphorus	...	0·13	0·15	0·38

Carbohydrates are usually present in negligible quantities in the muscle. In the present analysis there is found a deficit of 2 to 3%, which has not been accounted for and this is, pherhaps, to be related to extractives etc., similar to the observations of Saha and Guha (1939).

Labeo fimbriatus is found to be richer in moisture, ash, fat, and iron than *L. rohita* and *L. calbasu*. But the latter are found to contain greater quantity of protein than *L. fimbriatus*.

Acknowledgments

I am extremely thankful to Professor R. V. Seshaiya for suggesting this problem and guidance; and to Professor P. Govindan for his criticism.

REFERENCES

Appanna, T. C. and Devadatta, S. C. (1942) ... *Current Sci.*, **2** (3), 333.

Association of Agriculture Chemists (1945) ... Methods of Analysis, Association of Agricultural Chemists, Washington.

Basu, K. P. and De, H. N. (1938) ... *Ind. Jour. Med. Res.*, **26** (1), 177.

——————— (1938 a) ... *Ibid*, **26** (1), 191.

Burns, C. M. and Henderson, N. (1935) ... *Biochem. Jour.*, **29**, 2385.

Chari, S. T. (1948) ... *Ind. Jour, Med. Res.*, **36** (3), 253.

Elvehjem, C. A. (1930) ... *Jour. Biol. Chem.*, **86**, 463.

Kennedy, R. P. (1927) ... *Ibid*, **74**, 385.

Khorana, M. L. Sarma, M. L., Seshagiri Rao, P. and Giri, K. V. (1943) ... *Ind. Jour. Med. Res.*, **31** (1), 25.

McCrudden, F. H. (1911) ... *Jour. Biol., Chem.*, **10**, 187.

Mitra, K. and Mitra, H. C. (1911) ... *Ind. Jour. Med. Res.*, **29** (2), 315.

Niyogi, S. P., Patwardhan, V. N., Acharya, B. N. and Chitre, R. G. (1941) ... *Ibid*, **29** (2), 279.

Nottingham, P. M. (1952) ... Ph.D. Thesis, University of Aberdeen, England.

Saha, K. C. and Guha, B. C. (1939) ... *Ind, Jour. Med. Res.*, **26** (1), 921.

——————— (1940) ... *Ibid*, **27** (4), 873.

Setna, S. B. Sarangadhar, P. N. and Ganpule, N. V. (1944) ... *Ibid*, **32** (2), 171.

Tisdal, F. F. and Kramer, B. (1921) ... *Jour. Biol. Chem.*, **48**, 1.

COMPOSITION OF MILK OF CAMEL

By

S. P. Ohri and B. K. Joshi,*

Rajasthan College of Vety. Sci. and Animal Husbandry, Bikaner.

Little is known about the milk of camel with regard to any special qualities it may have for use as human food. As the camels are not maintained in all parts of the country so it has not attracted sufficient attention from scientific workers. The problem however is quite significant in areas like Rajasthan which has (according to census of 1956) a camel population of 436237. An opportunity was therefore, taken to study the various aspects of milk of camel.

Materials and Methods

Milk samples were obtained from 50 she camels maintained at Rajasthan Camel Breeding Farm, Bikaner. Since these camels are not

* S. P. Ohri, B.V.Sc., Dairy Farm Manager-cum-Lecturer and B. K. Joshi, B.V.Sc. & A.H., Research Assistant-cum-Demonstrator at the above college.

maintained for milk production and are not accustomed to regular milking, so efforts were made to collect sample from the udder when the calf was suckling. Care was however taken to remove complete milk from one or two quarters so that each sample collected was fully representative of fore milk, middle milk and the stripping portion of milk. In all 100 samples from 50 she camels in milk in almost all stages of lactation were studied. The study comprised both of the physical properties and the composition of various constituents of milk of camel. The techniques applied for the observation of physical properties are given in the remarks column against each observation. For testing the composition of milk fat of various samples the milk was tested by Gerber's method of fat determination. Kjeldahl's method for the determination of total nitrogen was used for the estimation of total proteins. The total solids content and mineral matter were tested by gravimetric method and milk sugar by difference in rest of the milk analysis.

TABLE I

Table showing the physical properties of camel's milk.

S. No.	Property	Observation	Remarks
1	Colour	White opaque	Naked eye observation
2	Odour	Faintly sweetish	Objective test
3	Taste	Sweet but sharp	Actual testing
4	Viscosity at 82°F	1·17 times as viscous as water	Draining from pipette
5	Consistancy	Thicker than cow's milk but thinner than buffalo's milk	By comparison with milk of cow and milk of buffalo
6	Specific Gravity	1·0268 to 1·0356	Lactometer method
7	Specific heat	0·9465	Calorimeter method
8	Refrective Index	1·3495	ABBE-Refractometer
9	Boiling point	212·0°F	By boiling at atmospheric pressure
10	Hydrogen ion concentration.	6·68	By Bekman's ph meter
11	Titratable acidity	0·03 (after 2 hrs.) 0·149 (after 6 hrs.)	By titration

TABLE II

Table showing the percentage composition and range of variation of milk of camel. (Samples tested.....100).

S. No.	Constituents	Maximum	Minimum	Average
1	Water ...	89·60	85·08	86·43
2	Total solids ...	14·92	10·40	13·57
3	Fat ...	5·5	2·6	3·78
4	Total proteins ...	5·3	3·2	3·95
5	Milk sugar ...	6·41	3·12	4·88
6	Mineral matter ...	1·40	0·69	0·95

Discussion and Conclusion

A comparison of similar work of others like Dragendoff (3), Machetti Carlo (3), Davies (2) with the present study indicates little difference in the composition of milk of Indian camel and camels maintained in other parts of the world. The slight deviation in results can be attributed to the great variation in the food of camel under different circumstances. Milk from all the four quarters appear to have the same composition. When compared with the milk of other species the camel's milk approaches nearest to Goat's milk (1). As compared to Buffalo's milk (1) the milk of camel is deceidely poorer in total solids. The milk of camel compares favourably with human milk (1) in every respect except sugar which is lower in camel's milk. In comparison to cow's milk (1)which is most widely used milk in India, the camel's milk has less total solids and fat but has more proteins, sugar and mineral matter. This point needs consideration and study by people making formula feeds for infants.

Summary

1. 100 samples of milk from camel in all stages of lactation were tested to study its physical properties and chemical composition. 2. Composition of milk of camel is compared with milk from other species and it is noted that its composition may be considered suitable for infant feeding.

Acknowledgment

Our thanks are due to Dr. Mohan Singh Purohit, Principal, Raj, College of Vety. Sci. and A.H., Bikaner for his encouragement in this study. Thanks are also due to Sarv Shree Hanuman Singh & Mool Singh, Camel Improvement Officers, Rajasthan for extending the facilities to undertake this study.

REFERENCES

1. Davis, J. C. and MacDonald (1953) ... Richmond's Dairy Chemistry. Fourth ed. Charles Griffin & Co. Ltd., London.
2. Davies, W. L. (1939) ... The Chemistry of Milk. 2nd ed. Champman & Hall Ltd., London.
3. Steel, J. H. (1890) ... A manual of Diseases of Camel. 1st ed. Printed at the Laurence Asylum Press, Mount Road, Madras, by G. W. Taylor.

Clinical Article

FRACTURE AND RESETTING OF A SKELETAL DEFORMITY

By

F. D. Wilson,

Professor of Surgery, Madras Veterinary College

Introduction

Refracture including resetting of bones is rather uncommon in veterinary Orthopaedic Surgery. This is partly because monetary considerations out-weigh the sentiments of the owner and partly because of difficulties in post-operative care of the patients.

On 2—3—1961 the owner of a black and tan Alsation, aged 1½ years, brought his dog for consultation. The dog had a foot deformity in the right limb and the owner was eager to know whether this could be rectified.

The Case History...was as follows:—The dog sustained a fracture about 4 months back. The fracture was reduced and the limb enclosed in a plaster cast by a private practitioner. The cast became loose but was retained for a month. After removal, the animal failed to place weight on the pads of the affected limb and the limb from the knee downwards was twisted outwards.

Symptoms:—The animal when walked hopped on the 3 sound limbs but at times rested the affected limb. When this was done there was Valgus and not only the pads but also the inside of the knee touched the ground. There was no evidence of a false joint anywhere but both the radius and ulna at the distal end of the metaphyses appeared turned and flattened outwards.

The elbow was dropped but there was no evidence of paralysis. A roentgenogram of the affected part comfirmed the clinical findings and revealed trabeculations. The lower end of the radius and ulna showed no medullary cavity and appeared as a flat bone. The lower third of the limb could not be straightened out to permit the pad to rest on the ground. There was no pain or tenderness over the region.

Surgical Treatment:—The owner was advised to admit the Alsation as an in-patient and the region from the lower third of the forearm to the middle of the metacarpal region was clipped and prepared for aseptic surgery.

The operation was performed on 3-3-61. Anaesthesia was induced by the intravenous injection of Nembutal 8 Grs. in 8 cc. of Aqua distillata.

After careful draping and taking all aseptic precautions a semi-circular incision was made ½" above the carpal joint anteriorly, to encompass half the circumference of the limb. Two other incisions 1" in length were made at right angles at both ends of the original incision. The skin flap was dissected out to give room for carefully unloosening the adherent skin from the underlying subcutaneous tissue, tendon and bone on the posterior half of the limb. After carefully deflecting the tendons and the vessels and nerve supply to the wrist and pad, a bone cutter was introduced and both the radius and ulna were cut 1" above the carpal joint. A second cut was made on both the bones and ½" of bone was removed. The tendons and other vital structures were brought back to position and the skin incision closed with wire sutures. Splints were applied after stretching the limb which was then encased in P.O.P.

Post Operative Care:—For the first 2 days only Calcium ostelin with Vit B_{12} was given sub-cutaneously. But on the 5th morning the dog had bitten through the cast and cut some sutures also. So the cast was removed and reapplied. Simultaneously Strepto-pencillin treatment was commenced. This was given for 5 days — The Calcium Ostelin was also continued. The dog was very non-co-operative and even after the application of the Muzzle and Elizabethan collar was biting through the cast. So finally a ½" wire mesh cage for the limb was constructed and this firmly secured to the limb after applying a P.O.P. bandage. With this device on, the animal was prevented from biting the limb.

On 7—4—1961 the dog was discharged with only the cast on, but was brought weekly for inspection and either recasting or strengthening of the cast was done. The plaster cast was finally removed on 29—4—1961. The dog was able to rest only the pads on the ground but showed considerable muscle atrophy. The owner was advised to massage the limb with shark liver oil and to make the animal swim.

Discussion

The Roentgenogram at first sight appeared to be the picture of a giant cell sarcoma, now known as a benign giant cell tumour. There was thinning of the cortext along with the appearence of a multilocular bone cyst. But taking the history into consideration it is possible that a young growing and active dog had started over using the limb before proper calcification had occured after fracture and this had flattened out the bone and produced the deformity.

The result of histopathological examination of the excised bone was "Moderate degree of rarefaction present". This confirms the second view.

A doubt might arise as to why after removal of bone, bone pinning was not resorted to for bone apposition. The site of practure was unsuited for pinning for (a) the pin could not have been withdrawn, (b) the proximity of the joint, (c) the bone itself at the site was flat and rarefied. On the other hand splints served the same purpose much better, as otherwise the limb would have been shortened.

Summary

(1) Surgery for an acquired deformity of the radius and ulna is described.

(2) The deformity was corrected by removing portions of the radius and ulna and then plaster casting the whole limb with splints.

(3) A useful and cheap limb cage for non co-operative patients is indicated.

Acknowledgment

The author wishes to thank the Post graduate students of Branch I for their assistance during the operation; the Dept. of pathology for their co-operation; and the Principal, Madras Veterinary college for the facilities provided.

Abstracts

Studies on the life-history of *Pseudodiscus collinsi* **(Cobbold, 1875) Sonsino, 1895, an amphistomatous parasite of equines and elephants in India**:—By Peter, C. T. and Srivastava, H. D. (1960). *Ind. J. Helminth.*, **12**, 1-17.

Pseudodiscus collinsi is limited in its distribution to the Asiatic countries and is of common occurrence in North India in equines. The authors have studied in a detailed manner the morphological features of the adult parasite, redia, cercaria and metacercaria. The fresh water snail *Indoplanorbis exustus* was found to be the natural intermediate host. The cercaria was differentiated from the other members of the 'Diplocotylea' group. The time taken for the development of the mature parasite after ingestion of metacercaria was found to be three months.

V. S. A.

Studies on the life-history of *Gastrodiscus secundus* **Looss, 1907, an amphistomatous parasite of equines in India**:—Peter C. T. (1960). *Ind. J. Helminth.*, **12**, 18-50.

This is the first detailed report on the life history of *Gastrodiscus secundus* which is widely distributed throughout India infecting equines

commonly. The egg was found to hatch in 11 days and the span of life of the miracidia was 11 hours. Only *Indoplanorbis exustus* was found to act as the intermediate host. Sporocyst, redia, daughter redia and cercaria developed in the snail in 5, 13, 23 and 38 days respectively after miracidial penetration. The snail discharged cercaria after 52-53 days. The cercaria was found to encyst on vegetations in 5-20 minutes. It took 14 weeks for the development of adult parasite in the body of definitive host after ingestion of metacercaria.

V. S. A.

The anthelmintic activity of Thiabendazole (M. K. 360):—By Hebden, S. P. (1961). *Aust. Vet. J.*, **37**. 264-269.

The laboratory and field trials conducted by the author on the anthelmintic activity of Thiabendazole [2-4' - Thiazolyl - benzimidazole - M. K. 360 of Merck Sharp and Dohme Research Laboratories] in sheep is reported. 50 Mgm/Kgm. body weight orally was the dosage employed. The drug was found to be highly potent against *Haemonchus*, *Trichostrongylus*, *Ostertagia*, *Nematodirus* and *Oesophagostomum*. It is also found to be non-toxic. The above results indicated M. K. 60 as superior to Phenothiazine or any other anthelmintic against important gastro-intestinal nematodes of sheep.

V. S. A.

The activity of Amicarbalide against *Babesia bigemina*:—By Shone, D. K., Wells, G. E. and Waller, F. J. A. (1961). *Vet. Rec.* **72**, 736-740.

The authors compared the activity of amicarbalide (3 : 3) - diamidino-carbanilide with that of Phenamidine against *Babesia bigemina*. Deep intramuscular injection of the former at a dose rate of 10 mgm/kgm. body weight gave a prompt response. The earlier disappearance of the parasites from the blood and the better condition of the treated animals pointed out the distinct advantage of amicarbalide over phenamidine.

V. S. A.

A new anthelmintic Thenium (N : N - Dimethyl - N 2 - phenoxyethyl - N - 2' - thenylammonium) p - chlorobenzene sulphonate : Its activity against hookworms and roundworms in the dog:—By Rawes, D. A. and Clapham, P. A. (1961). *Vet. Rec.*, **73**, 755-758.

The authors investigated the efficacy of Thenium p - chlorobenzene sulphate in dogs infected with *Ancylostoma caninum*, *Uncinaria stenocephala* and *Toxocara canis*. Oral administration of 200-250 mgm. bose of the drug in the morning and evening for a day to individual dogs

was found to be highly effective against *A. caninum* and *U. stenocephala*. The activity of the drug in this dosage was low against *T. canis*.

V. S. A.

Improving the Quality of Silage:—Ground limestone and urea (0·5% each), added to corn (maize) silage in small quantities, can speed gains of feed lot-cattle, according to tests conducted by E. W. Klosterman and H. E. Henderson at the Ohio and Michigan State Universities respectively. Limestone and urea were added to the corn silage by sprinkling the material on top of the loaded wagons. The materials were thus mixed with the silage as it was blown into the silo. Heifers fed with the treated corn silage gained 11% faster than those fed with untreated silage. (Feed Age, June, 1961).

B. Panda.

Rapid Milking Produces More Milk:—The hormone, OXYTOCIN, which causes the contraction forcing milk into the milk cistern of the udder is effective only for a few minutes and quick milking takes advantage of its full potential, according to C. W. Turner, University of Missouri. Rapid milking has the additional advantage of saving significant amounts of labour time. (Feed age, June, 1961).

B. Panda.

Role of Hormones in Broodiness:—Turkey broodiness is strongly affected by the proportion of two hormones, GONADOTROPIN and PROLACTIN, according to test conducted at the University of Wisconsin. When a turkey hen stops laying, her body contains a predominance of prolactin. Placing the hens in a well-lighted pen for 24 hours or giving them injections of gonadotropin will break the broodiness. Gonadotropin hormones, however, are not yet commercially available.

(Feed Age, June, 1961).

B. Panda.

Raw Wheat Germ Detrimental to Growth:—A toxin or growth inhibitor in raw wheat germ has been reported by R. D. Greek, University of Maryland. The factor, which is detrimental to the growth of the young chicks, is apparently destroyed by heat. Pressure cooking of meal improved growth 38% over the controls receiving the raw germ. The primary effects of the toxin, it is indicated, is to block the absorption of fat, although some studies indicate that protein retention is also involved. (Feed Age, July, 1961).

B. Panda.

The Efficacy of Vaccination against Ranikhet (Newcastle) Disease in face of Outbreaks:—By J. Das, S. N. Panda and B. N. Acharya (1961). *Animal Health* 2 (2), 23–25.

The authors report on the efficacy of Ranikhet Disease vaccination in face of 35 serious outbreaks of this disease in Orissa. It was found that best results were obtained when vaccination was undertaken within 24 to 48 hours after the outbreaks started, in as much as 92 to 97% of the birds could be saved.

When vaccination was done 48 hours after outbreak, the percentage of success was 79, while after 72 and 96 hours the percentage fell to 67 and 39 respectively. The immediate protection is believed to be due to interference phenomenon or cell block reaction. The importance of these observations in relation to the epidemiology of the disease has been discussed.

N. K. Dutta.

News and Views

Dr. M. N. Menon, G.M.V.C., B.V.SC., A.I.D.R.I., F.R.C.V.S.:—We congratulate Dr. M. N. Menon on his appointment as the Director of Animal Husbandry Department of Kerala State. Dr. Menon needs no fresh introduction to our readers as we had written about him quite elaborately in 1957 when he achieved the unique distinction of being the first Indian to secure the Fellowship of the Royal College of Veterinary Surgeons. As Principal of the Kerala Veterinary College he was untiring in his efforts to shape that College into a model one. Now as head of the Department, this talented officer has better chances of serving the people in rural areas, in all Animal Husbandry matters. We wish him all success !

* * *

Dr. C. T. Peter, B.SC., G.M.V.C., B.V.SC., M.SC., PH.D., has succeeded Dr. M. N. Menon as Principal of the Kerala Veterinary College. He is indeed a worthy successor to Dr. M. N. Menon and we feel certain that much of the work left undone by his predecessor to make that College a model one will be faithfully carried out by Dr. C. T. Peter. We congratulate Dr. Peter and wish him all success !

* * *

Conference on the use of Radioisotopes:—The International Atomic Energy Agency, the Food and Agricultural Organisation of the United Nations and the World Health Organisation are jointly organising a Conference on the use of Radioisotopes in Animal Biology and the Medical Sciences in Mexico City from November 21st to December 1st 1961. It will serve the purpose of making the Medical Scientists more fully aware of the potentialities of radioisotopes techniques in studies on general physiology and biochemistry. (The *Veterinary Record* 5—8—1961).

* * *

Emeritus Professor R. M. Gordon, O.B.E., M.D., SC.D., F.R.C.P., D.P.H., D.T.M. This well-known Parasitologist, we are deeply grieved to note, died on 25th July 1961. Nearly all his working life had been spent in the Liverpool School of Tropical Medicine. For over twenty years he has been teaching Parasitology to Veterinary students, many of whom we are sure, will receive this news with extreme regret. Even in his last days, in collaboration with a young Veterinarian, he was engaged in research into the experimental infection of tsetse flies with trypanosomes. We mourn the loss of this eminent scientist.

* * *

Sir S. V. Ramamurthi, I.C.S. (Retd.) and former Adviser to the Planning Commission, in a recent University lecture, asked administrators in the higher ranks not to be "yes men" and said their duty was to state *frankly* what they thought to be right and then carry out *loyally* what they are ordered to do. What a timely advice and that, in such a tabloid form ! Sycophancy is rampant and there is hardly any honest expression of opinion in these days. It is sickening in the extreme. There are not only ' yes ' men but there are ' yes ', ' yes ' men ! O Tempora ! O Mores !

* * *

Greatness of Tagore:—" The genius of Tagore was his catholicity of temperament. Though a lover of Bengali, he was a lover of other languages as well. He was a great nationalist and at the same time a greater internationalist". Thus spoke Dr. A. L. Mudaliar recently at a meeting of the Madras University to celebrate the Tagore Centenary.

* * *

A Student's duty:—At a meeting of the D. A. V. College Union, Kanpur, Mr. Nehru said " Whatever may be your sphere, you should prepare and train yourselves to become men of quality. A nation is known by its trained men of quality and not by mere quantity.

* * *

What Lenin said:—Mr. Nehru further said " I was recently in Moscow where in a hall I saw a whole wall covered with a mural showing Mr. Lenin talking to students and answering their question " What should we do ? ". The mural gave Lenin's reply in these words. " The first thing for you to do is study. The second thing that you should do is study. The third thing which you should do is study." Mr. Nehru said that ' study ' here meant fully preparing oneself in one's sphere of work.

Association News

The Indian Veterinary Association

THE 15th INDIAN VETERINARY CONFERENCE

The Uttar Pradesh Veterinary Association has invited the 15th Indian Veterinary Conference to meet at Mathura or Lucknow either in December 1961 or in January 1962. The Managing Council of the Indian Veterinary Association has agreed to the proposal. A definite announcement will appear in the November 1961 issue of the *I. V. J.* The profession is kept alerted on this matter quite in advance.

Madras,
3rd Oct. 1961.

V. S. ALWAR,
General Secretary,
Indian Veterinary Association.

A FAREWELL PARTY

The Editor of the *Indian Veterinary Journal* met Dr. M. S. Jayaraman, Assistant Editor, at Tea at Hotel Dashprakash, Madras, on the eve of his departure to U. K. Mrs. Jayaraman was also present. A select gathering of about 30 persons responded to his invitation and it was quite an enjoyable evening.

In bidding farewell to Dr. and Mrs. M. S. Jayaraman, the Editor recaptulated how Dr. Jayaraman volunteered his services quite unasked, unsolicited and free and how he was a tower of strength to him. He said Dr. Jayaraman had completely imbibed the spirit of the *I.V.J.* which is one of dedicated service. His love for the profession and his belief in its integrity and honour were his chief assets, said the Editor and he further added that Mrs. Jayaraman had caught the 'infection' from her husband and was ably helping him in his journalistic work from behind the screen. He wished them *bon-voyage*, happy stay in U. K. and safe return.

Replying, Dr. Jayaraman thanked the Editor for having raised him to a place of honour within the profession. He expressed his gratitude to the Director of Animal Husbandry, Madras, to the Principal of the Madras Veterinary College and to the Professor of Bacteriology Dr. U. K. Menon, for all the help he has received at their hands in his career.

THE RESERVE FUND

An event of great importance to the Veterinary profession in India, took place in August 1924. It was the birth of the *Indian Veterinary Journal.* Circumstances were positively hostile and yet the profession took that bold step and the lion-heartedness of the early

pioneers cannot be too highly praised. Ever since then, the *I.V.J.* has toiled hard under very adverse circumstances. The *I.V.J.* lives to-day so that the profession could prosper and Science advance.

And now the hat is sent round so as to place this journalistic venture on a sounder and firmer basis. The *I.V.J.* is a priceless possession of our profession. It has placed the Indian Veterinary Surgeon, on the map of the scientific world. Just pause and ponder over, how much we owe to the *Journal* both individually and collectively. Is it too much then to expect the profession to respond to the appeal issued for a Reserve Fund? We hope not.

Some enquiries have come to us asking us to indicate the extent of help expected. We do not want to put the members of the profession to any undue financial strain in these hard days. At the same time, a certain amount of sacrifice is needed to make this fund a great success, so as to make it worthy of our profession. So we feel that the following scale of contribution will be quite reasonable. It could even be paid in two or three instalments.

Class I Officers	...	**Rs. 100/- and above.**
Class II Officers	...	**Rs. 50/- and above.**
All others	...	**Rs. 25/- and above.**

It is our ambition that no Veterinary Surgeon in this land should remain without contributing to this fund. Brick by brick, this great edifice of ours should begin to rise higher and higher. On the success or otherwise of this venture, the solidarity of our profession depends. "*Pay and Prosper*" is the slogan we pass on to the members of our profession. Jai Hind!

T. VINAYAKA MUDALIAR,
Editor, The Indian Veterinary Journal.

THE I. V. J. RESERVE FUND

LIST OF CONTRIBUTORS

		Rs. nP.
Amount acknowledged (August 1961 issue)	...	6,210.05
Dr. C. G. Bhasker, S. I. T. C., Madras, 3rd instalment	...	25.00
„ T. H. Gudi, V. O. Viramgam, Gujarat State, 1st instalment	...	12.00
Total	...	6,247.05

Cheques, money orders and all correspondence should be addressed to the Editor, *The Indian Veterinary Journal*, Madras-17.

In Memoriam

(CONTRIBUTED)

Dr. M. MAHMOODULLAH

Dr. M. Mahmoodullah, B.Sc., M.R.C.V.S., retired Director of Veterinary Services, erstwhile Hyderabad State, passed away prematurely on 11-9-61 after a severe heart attack. Born on 10-5-1907 in a very respectable family and after taking the M.R.C.V.S., diploma from London, he was first appointed as the Assistant Director of Veterinary Services, Warangal Subah, from which he rose to the position of the Director of Veterinary Services, Hyderabad State. During his tenure of office, he had introduced and implemented many salient schemes and was solely responsible for getting the scale of pay of Veterinary Assistant Surgeons enhanced to Rs. 215-415 and in so doing had sacrificed his own personal interests. His genial disposition, lovable personality and a great fund of affection for every one, had endeared him to one and all. After relinquishing his post as Director of Veterinary Services at Hyderabad so as to uphold his own prestige and self respect and a great principle, he had taken up service at Khartoum, Sudan, and was in Hyderabad recently on three months vacation, when due to a severe heart attack he passed away on 11-9-61.

M. A. H.

We have personally known Dr. M. Mahmoodullah. He was one of those Nature's gentlemen who once seen cannot be forgotten. He was Nobility personified. We mourn the loss of this esteemed colleague and we offer our heartfelt condolences to the members of the bereaved family.

Ed., I. V. J.

ERRATA

Vol. 38, No. 9 (September 1961).

Page 470 (Statement).

Serial No. 2. Dose of Spiro—*Read* 3 ml. *instead of* 8 ml.

Page 472, para-3, 2nd line—*Read* 1 ml./5 kg. *instead of* 1 ml./10 kg.

Protective Feeding with 'NEFTIN'

In poultry, unthriftiness from non-specific infection can cause greater economic loss than mortality from such diseases as Fowl Typhoid, Pullorum Disease, Salmonellosis and Coryza. A medication therefore, which is effective not only in the treatment and prevention of such diseases, but also in the suppression of non-specific infection, is invaluable. 'Neftin', with its wide antibacterial spectrum, is highly successful in all three contingencies.

Continuous benefits from the disease-fighting properties of 'Neftin' can be obtained with the 'Neftin' Week-a-Month Plan, a simple and economic schedule for disease prevention in growing and laying fowls. As a reliable aid to positive health and higher egg production you can recommend, with the utmost confidence, the addition of 'Neftin' to poultry feeds—at preventive level—for one week in every four.

'Neftin' controls more poultry diseases than any other medication. Utilise it now, with the

'NEFTIN' WEEK-A-MONTH PLAN, FOR:

- **reducing death losses in chicks**
- **helping growers to thrive**
- **increasing egg production**

'Neftin' is available in containers of (1-lb.) 450 g. and (7-lb.) 3.2 kg. from Pharmed Private Ltd., Bombay, Calcutta, Delhi, Madras.

SK&F Life-saving nitrofurans

Advisory literature and further information are available on request from:
Smith Kline & French (India) Limited
(Incorporated in England with limited liability)
141 Fort Street, Bombay 1.

'Neftin' (trade mark) brand of furazolidone.
Ind. Pat. Nos. 56634/56

NF: PA 41 Ind.

When writing to advertisers, please mention *The Indian Veterinary Journal.*

Ocean Surgical Company, New Delhi

If you have not so far dealt with the oldest and foremost Company for the manufacture of Veterinary Instruments and supplies, please do not hesitate to ask now in first instance the most trusted of your suppliers.

OCEAN SURGICAL CO.,

(Suppliers of Veterinary Needs)

Post Box No. 2523

51/2, ORIGINAL ROAD — KAROL BAGH

NEW DELHI-5.

BRANCHES:

1. No. 9, Catholic Church Building, Hazrat Ganj, LUCKNOW, *(U. P.)*
2. "Sharma Building", M. I. Road, JAIPUR, *(Rajasthan.)*

TELEGRAMS: "OSHSURGICO" — TELEPHONE: 5339

Veterinary Books

		Rs.	nP.
DUKES' Physiology Domestic Animals 1960 rpt. Sh. 80/-	...	50	00
SRINIVASAN: Mat. Medica, Pharmacology & Veterinary Therapeutics 1960	...	14	00
do. Treatise on Treatment Vol. I	...	8	00
do. Treatise on Treatment Vol. II	...	8	00
HAGAN'S Infectious Diseases of Domestic Animals 1961 just out	...	57	50
SAMPATH-KUMARAN: A. I. & Animal Production 1960 rpt.	...	15	00
PERRY: A. I. of Farm Animals 1960 fully illtd.	...	32	50
MAHADEVAN: Dairy Cattle Breeding in the Tropics 1958	...	12	19
GILBERT: Mineral Nutrition of Plants & Animals 1950 illd.	...	9	27
MANN: Biochemistry of Semen 1954 240p. illtd.	...	13	00

SARCOR BOOK COMPANY

PALLIARAKAV ROAD — MATTANCHERI — COCHIN 2 (S. INDIA).

VETERINARY HYGIENE

FOR INDIAN CONDITIONS

By EHSANULLAH

The Fast Selling and the most Popular Book on the subject.

Second revised reprint is now ready

Pages VIII + 150 **Price Rs. 3 only**

Publishers:

SEVEN SEAS

Chadarghat, Near Kamal Talkies

HYDERABAD-Dn. 24. (INDIA)

Sole Distributors:

M/s. S. BHATACHARYA

Kachiguda Station Road,

HYDERABAD.

Veterinary Specialities

BAYER

»Bayer«

Leverkusen, Germany

ANTIMOSAN	:	An injectable organic antimonial specific for bovine schistosomiasis. Also indicated in stephanofilariasis in cattle, haemorrhagic filariasis in horses, lungworm in cattle, sheep and goats and dirofilariasis in dogs. Bottles of 500 cc. Boxes of 5 bottles of 50 cc.
CATOSAL	:	Injectable organic phosphorus compound for acute disturbances of the metabolism, in exhaustion and weakness. For increasing physical power. For the stimulation of the central nervous system in unconsciousness. Bottles of 100 cc.
MASTICILLIN	:	A penicillin ointment (100,000 I.U.) for the treatment of streptococcal mastitis. Boxes of 6 tubes of 7·5 g. each.
MASTICILLIN "M"	:	An ointment containing Masticillin and a broad-spectrum sulphonamide for treatment of chronic and complicated cases of mastitis. Boxes of 6 tubes of 7·5 g. each.
NAGANOL	:	The renowned remedy for surra. For prophylaxis, can be applied i.m. in combination with hyaluronidase. Bottles of approx. 14 g., 28 g., and 100 g.
NEGUVON	:	A powerful anthelmintic and parasiticide for use in domestic animals. Containers of 100 g. and 1 kg. powder.
ODYLEN	:	A specific for skin diseases, especially mange, itches and eczema. Also effective against body vermin. Irritation is relieved almost at once after application. Bottles of 100 cc.
PROLAN ad. us. vet.	:	Regulator and activator of the sexual functions in males and females. Indicated in the absence of heat or feeble heat (frigidity) due to ovarian hypofunction. Lack of sexual desire in male animals. Boxes of 2 amps. of 250 I. U. each + 2 x 5 cc. amps. of dist. water. Bottles of 25 cc. oily suspension of Prolan contg. 200 I.U. per cc.
PROLAN-E-OIL ad. us. vet.	:	PROLAN with addition of vitamin E. Bottles of 25 cc.

Sole Importers in India:

CHOWGULE & CO., (HIND) PRIVATE LTD.

P. O. Box 1478, Bombay-1.

— Latest Books —

1.	SALISBURY	: Physiology of Reproduction & Artificial Insemination of Cattle, 1961	... Rs. 62·50
2.	CARLSON	: Veterinary Radiology 1961	... Rs. 92·50
3.	NOBLE	: Parasitology : The Biology of Animal Parasites, 1961	... Rs. 45·00
4.	SCHALUN	: Veterinary Hematology, 1961	... Rs. 47·50
5.	RENSBURG	: Breeding Problems and Artificial Insemination	... Rs. 27·50
6.	AMERICAN KENNEL CLUB	: The Complete Dog Book, 1960 (over 125 illustrations)	... Rs. 30·00

Ask for Classified List of Veterinary Books.

BRITISH BOOK DEPOT

84, HAZRATGANJ — LUCKNOW (U.P.)

Stanes

CATTLE FEED — POULTRY FEED

Fishmeal, Sterilized Bonemeal, Shellgrit, Shellmeal, Poultry Mixture and STANES MINERAL MIXTURE

The only Tonic at low price with high tonic value. Prevents diseases due to deficiency in CALCIUM and PHOSPHORUS. Largely used by all the Agricultural Research Stations in Madras, and by the Veterinary Departments.

Sold in bags of 4 kgs, 8 kgs, 25 kgs & 50 kgs.

For further particulars write to:

T. STANES & CO., LIMITED,

Fertiliser Department, — P. B. 12, — COIMBATORE-1.

POULTRY BOOKS

		nP.
BILLINGS : Livestock & Poultry Diseases 1951 rpt. illtd.	... 30	00
HOWES : Modern Poultry Management illtd.	... 4	87
MANN : Poultry Breeding illtd.	... 3	50
MARSHALL : Egg Incubation 1952 fully illtd.	... 1	87
MORRIS : Poultry Keeping for Profit illtd.	... 6	50
P. W. S. : Starting Poultry Keeping illtd.	... 2	62
ROGER-CAMPBELL : Profitable Poultry Keeping in India illtd.	... 4	74
ROY : Poultry Production on Scientific Lines illtd.	... 1	25
THORNBER & HALE : Deep Litter System of Poultry Keeping	... 3	37
WINTER-FUNK : Poultry Science & Practice 1956 illtd.	... 33	00

Available from

SVASTIK SALES COMPANY

VETERINARY BOOKSELLERS — PAREL — BOMBAY-12

Telegram — CRESCENT **Telephone — 34-3404**

Rinderpest Eradication Scheme

BRAND VACCINATED ANIMALS WITH

"P.E.W. BRANDING INK"

Beware of Imitation — Do not be misled by spurious makes

A scientific chemical combination.

Produces a lasting and distinctly visible brand, usuable on Cattle and Buffaloes and other domesticated animals. Application is very easy, quick and absolutely economical. No wastage. Already in use in all Indian States. Innumerable animals have been branded in all States under Rinderpest Eradication Scheme with success.

It permeates into the layers of the skin evenly upto follicular layer over the branded area and forms an antiseptic dry scab that peels off in a few weeks, leaving a well defined visible brand mark. It does not produce any open wound and thus prevents extraneous infection.

Approved by

CENTRAL RINDERPEST CONTROL COMMITTEE,

NEW DELHI.

ALREADY SUPPLIED TO ALL THE DIRECTORATES OF VETERINARY SERVICES AND ANIMAL HUSBANDRY IN INDIA.

TRY ON YOUR ANIMALS ALSO.

This can be supplied in any quantity on order. Use our make special type of Branding Iron manufactured for the purpose.

G.T.V. SETS AND STAINLESS G.T.V. NEEDLES ARE ALSO SUPPLIED BY US.

★

For further particulars, please apply to:

PAUL'S ELECTRO WORKS

39, JORAPUKER SQUARE — POST BOX No. 11406

CALCUTTA-6