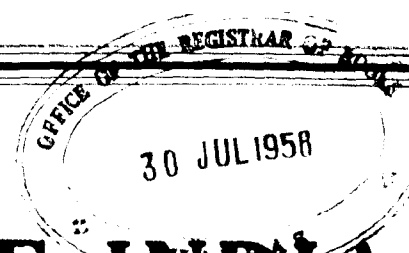


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(The Journal of the All-India Veterinary Association)

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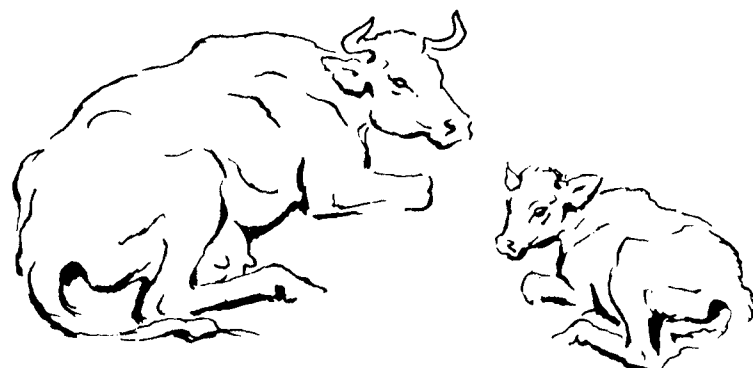
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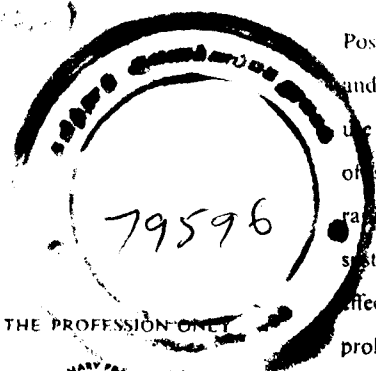


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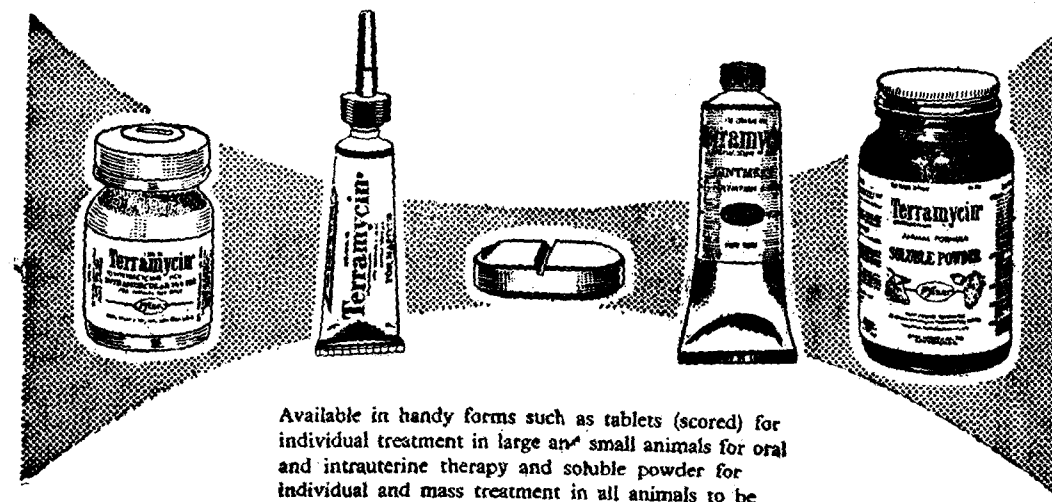
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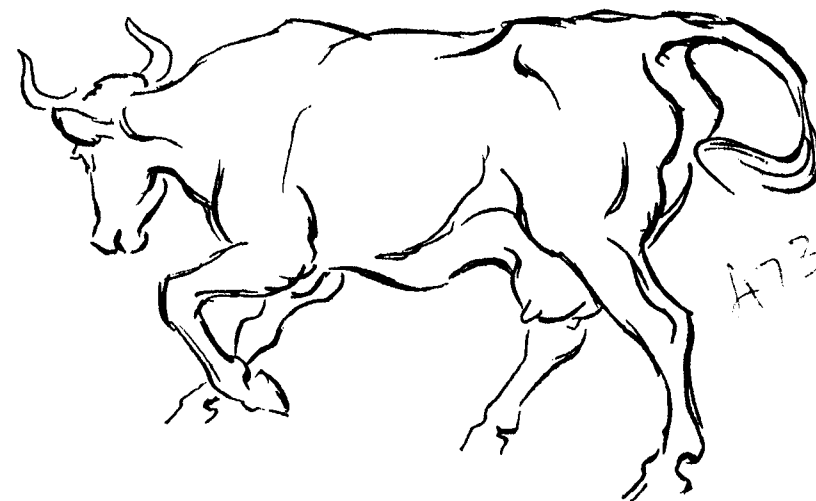
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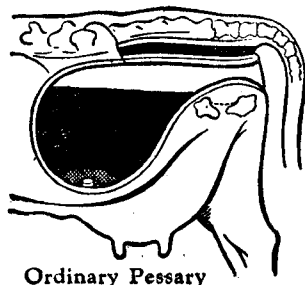
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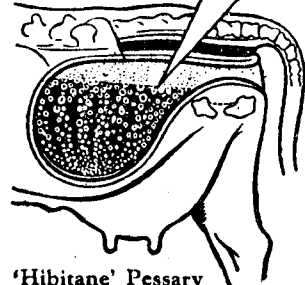
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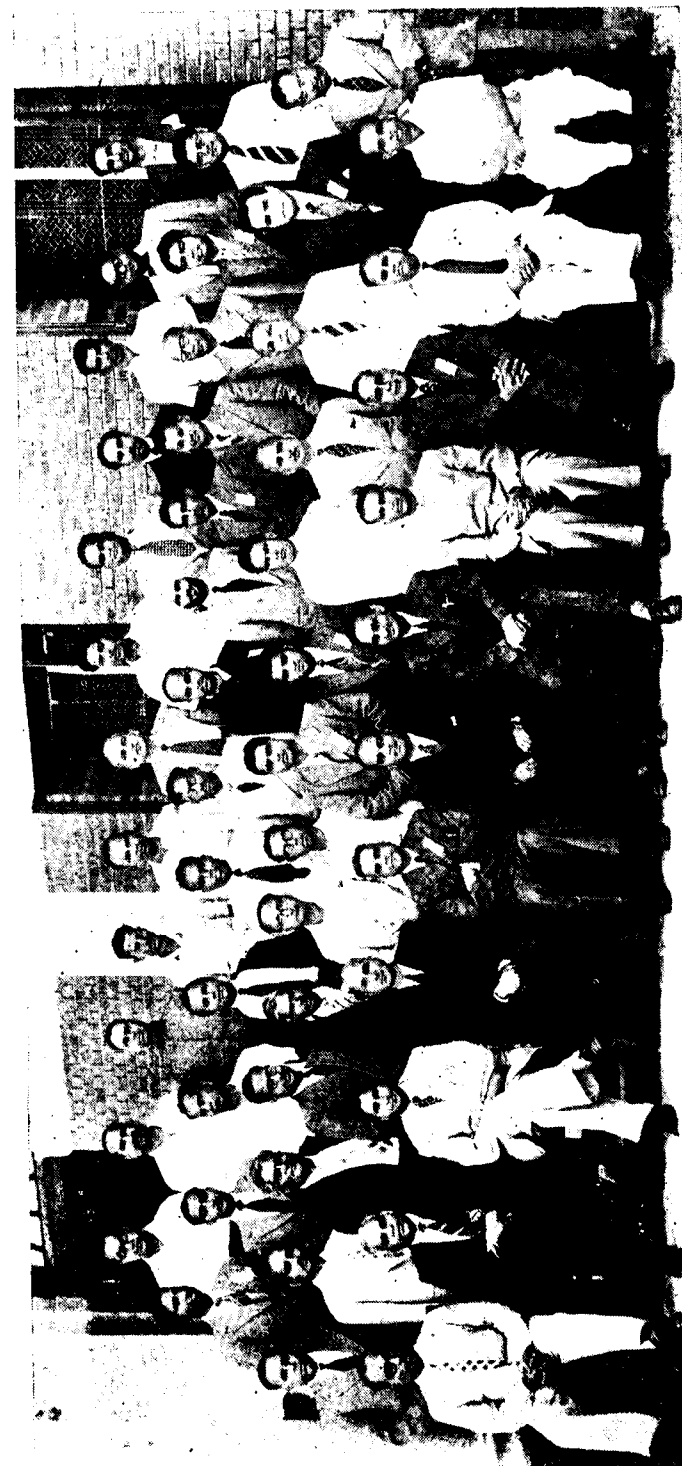
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Director of Animal Husbandry, Madras State.

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Editorial

THE INDO-AMERICAN REPORT

We confess it has never been our mis fortune to go through a more disappointing document, produced at such cost, as the report of the Joint Indo-American Team on Agricultural Research and Education. We wonder why it has not received wider publicity in the lay press, amongst the members of the Legislatures and Parliament and even amongst the general public. For it deals with a subject that vitally concerns the great agricultural economy of this ancient land. And unless sufficient public criticism is focussed on the subject, we fear the harm that is likely to follow any implementation of such a retrograde report, will put back the clock of progress by several decades, if not centuries.

The one question that struck us at the very outset was, "Where was the need for such a Team at this juncture?" Did the country ask for it either through its representatives or professions? We read and re-read the reasons given for the origin of the Team and the terms of reference to it. We feel absolutely unconvinced on the reasonableness of such a course. At least, were the State Governments and Directors of Animal Husbandry and Agriculture and expert professional bodies consulted on the necessity of such a Team, before a decision was taken? Evidently not. We question again the very composition of this Team. Animal Husbandry did not receive its due share of representation on this Team. It is well reflected in the very

first chapter on 'Introduction'. Under paragraph-3, the Team catalogues a long list of shortages in Agricultural production. Cereals, Pulses, Sugar-cane, Oil seeds, Jute, etc., have received attention but not a word is said on the more serious shortage of animal food production such as Milk, Meat, Eggs, Poultry, etc.

Next we ask, what is wrong with our present system of organisation, education and execution? We feel all these have been perfected after a good deal of thought, experimentation and local experience. What has been lacking is 'finance' and that has been the main stumbling block all these years. Due to that single factor, the necessary facilities at the several Veterinary Colleges in way of expansion of staff, buildings, laboratory equipment, experimental livestock farms, increased admission, etc., could not be proceeded with. This should not be put down to any defective system of education, organisation or execution. There seems to have been quite a lot of confused thinking in arriving at conclusions. The Team evidently was not clear in its mind as to the proper agency for Animal Husbandry work in this land. It was being influenced more by the American pattern which to say the least is most unsuited to the present day conditions of this land. India has developed a pattern of her own, which we feel is better of the two.

We have before us catalogues and calendars of several of the American Universities such as Kansas, Illinois, Wisconsin, Purdue, etc. Animal Husbandry is not necessarily part and parcel of a *regular* Agricultural or Veterinary course. Some teach and some don't. Nor are all the Animal Husbandry subjects taught in a single School or College; but there is provision within the same campus for specialisation in subjects like Animal Nutrition, Animal Genetics, Poultry Husbandry, Sheep Husbandry, Dairy Science, etc. One can specialise in any of the subjects he likes and go and work in a county which needs his services most in that particular line of work. It is a little complicated pattern which only rich America can afford.

The American Veterinary Medical School, as given in Appendix VII of the report, does not teach Animal Husbandry

subjects at all. It is no wonder then that in that land the Veterinarian has not *established* a special claim for Animal Husbandry work. Perhaps based on that knowledge, people go about talking lightly of Veterinarians not being suited for Animal Husbandry work in this country also, without understanding the historical back-ground of stage by stage development of Animal Husbandry Science in this country. It enjoys a scientific status in this land and not a commercial one.

The Veterinarian of to-day in India is completely fitted for any kind of Animal Husbandry work as could be seen from the curriculum of studies imparted to him. As is to be expected in all human enterprise, it is the quality that has to improve from day to day and it is bound to improve by sheer force of circumstances through advanced Post-graduate studies. It is this system of making *one* profession responsible for all work connected with *Animal Science*, that suits the peculiar economic condition of this poor land and the genius of its people. This is again the opinion of no less a person than Sir Thomas Dalling, Chief of the Animal Production Division of the F.A.O., who presided over a Seminar recently at Bombay. He said "India with its vast number of livestock and its need for these animals, has already *shown a lead*, as have some other few countries, on the necessity to *centralise* this vast subject in *all* its branches and aspects in the hands of specially trained personnel *viz.* Veterinarians".

India can't afford to have a number of Specialists to solve her rural problems, connected with a single subject—the livestock. She would like to develop, to use a livestock phraseology—a dual purpose scientist, to solve her livestock problems both in health and in disease. It is different in U.S.A. where the average size of a farm is 250 acres and out of 160 million people only about one-sixth live and work on the farm. It is the other way about in this land. Then why try to disturb the Indian system, which has just started to stabilise and bear fruit. It will only lead to disharmony and disruption. We therefore plead with all the emphasis we can command, not to keep on experimenting and shifting ground on a subject so intimately connected with the rural economy of this land.

At one place the report talks of "work-load" on an already limited staff and at another place it tries to tag on Animal Husbandry subjects to a curriculum of studies for Crop Specialists. It is a sure way of making a person neither the one nor the other. We have no objection to a working knowledge of Animal Husbandry subjects being imparted in Agricultural Colleges, but it must be only secondary to their main subject and must be taught by Animal Husbandry men.

Let us now get down to a few other important recommendations found in the report.

The Vice-President of the I.C.A.R. who is the Chief Executive Officer and Agricultural Advisor to the Government of India, is in future to be called the Executive President and be given the status of an Additional Secretary in the Ministry of Agriculture. We wish the Hon'ble Minister for Food and Agriculture is allowed to retain his higher status as a controlling authority over the I.C.A.R. and not dragged down to the position of its President and get mixed up with its constitution. He must be the Minister in charge, pure and simple, and the executive officer can then be called the President without having recourse to coining novel nomenclatures.

A more important and practical proposition is that this post of Chief Executive Officer should in future be thrown open to Agricultural and Animal Husbandry Scientists as well, who in addition to their scientific back ground, experience in planning, supervision and conduct of research, have the necessary administrative ability to hold that high office. We welcome this proposal. But on the face of such a healthy proposal, we doubt the wisdom of having a Deputy Executive President, as is envisaged in the report. This will only lead to friction with the Commissioners and Chiefs of the Scientific Council, who are bound to be Senior Officers of some standing and experience. Apart from this, where is the need to keep on multiplying offices under the I.C.A.R., as if a parallel Government is in the offing. We dread to think of an already big army of Regional Advisors, End-use Advisors, Subject-matter Specialists, Members of

Advisory Boards, Project Co-ordinators, Members of Commodity Committees, etc., etc. There must be a limit even in an ambitious planning. India cannot afford to keep this army moving from year to year. Further the Executive President will have Commissioners and a Council of Senior Specialists and Senior Secretaries to advise him. Why a Deputy President then? If it is for wielding higher administrative and financial powers, these could be entrusted with safety to the Commissioners or to the President himself.

The next proposal is to retain the post of Agricultural Commissioner as it is to-day but to split the post of Animal Husbandry Commissioner into two, viz. A Commissioner for Veterinary Services and a Commissioner for Animal Husbandry and Dairying. Subjects like cattle improvement, animal nutrition and feeding, sheep and goat improvement, poultry improvement, and dairying are all to be removed from the purview of the Animal Husbandry Commissioner and placed under the new Commissioner for Dairying. We ask what is the *agent provocateur* for such a drastic proposal. It is indeed a violent departure from the existing pattern which has been built up slowly but steadily under a unified control during the last quarter of a century or more. Are we to un-do it now?

It is only after the advent of these Animal Husbandry Commissioners that India's cattle have been defined, described, codified and sufficiently advertised. Before that, India herself was not aware of the enormity and variety of livestock wealth lying dormant in her own land. Development work of each breed was planned and put into execution without much ado, and the work is apace in every State. The potentialities of each breed are being determined and steps are taken to exploit those potentialities to the fullest. Selective breeding, grading up work, cross breeding, artificial insemination, nutritional research centres, milk colonisation schemes, dairy units, poultry improvement on a mass scale, sheep and wool industry, goat development, etc., are the results of the hard work put in by a long line of illustrious men who served as Animal Husbandry Commissioners and gave their best to this land.

The present proposal is therefore inexplicable and we refuse to believe that it could be anything but a lack of correct appreciation of facts. We are happy the Agricultural Commissioner is not to be subjected to such vivisection. We wish he at least retains his individuality intact and is not split into a Commissioner for Horticulture, a Commissioner for Soil preservation, a Commissioner for Agricultural Engineering and in fact a Commissioner for every Crop grown under the sun. We only hope the high and dignified office of the Animal Husbandry Commissioner is not subjected to the proposed vivisection. It will only undermine his influence and dissipate his potentialities for good work. Wisdom suggests he must be left alone, and with added powers if possible, to continue the good work that is being done now. The scientific co-ordination will be lost with disastrous results.

One other recommendation that arrests our attention is that the Indian Council of Agricultural Education should 'provide for representation' on its Council for the newly formed Indian Veterinary Council. We are happy they have recognised the need to consult the Indian Veterinary Council on such matters of vital importance to the profession. But we feel all such questions should in future be referred to the Indian Veterinary Council sufficiently in advance and their decision taken. But it is a matter which we prefer to leave to the Indian Veterinary Council to take care of.

There are several other matters of equal importance such as Promotion policies, Retirement policies, Salary levels, Staffing patterns, Joint Directors for extension work, Post-Graduate Colleges, etc., which we are not able to touch upon within the short space of a single editorial. We may return to these at a later date.

A BRITISH CORROBORATION

Since our editorial on the Indo-American Report, had gone into print, we happened to go through the following in the *Veterinary Record* of London. Under the caption 'Training the New Veterinarian', our esteemed contemporary writes a very informative editorial, extracts from which we publish below. We are happy we stand corroborated in the views expressed in our Editorial. And to those who are interested to know more about the Veterinary Education in America, we commend the article on "Veterinary Education in North America" by Mr. J. B. Polding, published in two parts in the *Veterinary Record* dated 7th and 14th April 1956. Here are the extracts:—

"Any educational system must inevitably be, in part at least, a reflection of life and activity of the community in which it is functioning; but it should aim also at influencing future trends. The American veterinary educational set-up undoubtedly does the former and does it well; the extent to which it is fitting itself for the latter task is, however, more debatable."

"But every system has its Achilles heel, and the excellence of much of the technical instruction in American Veterinary Colleges has at least two dangers. One is the tendency to superficiality in basic education seen at many levels in the American educational system, and the other is an understandable tendency to neglect in the schools those fields of Veterinary work which are at the moment less *commercially attractive* such as preventive and State medicine, and even Veterinary Public Health."

"If it be true, as is often claimed, that the long-term prosperity of the Veterinary profession in any country is associated with its ability to maintain the health and productivity of all livestock, there is always the inherent danger that undue concentration on the affairs of to-day may well jeopardise the success of to-morrow. To that end one can only regret the extent to which, in the United States, the lead in all matters of 'Animal Science', except in the purely clinical and therapeutic

fields, *has been allowed to slip into other and often less competent hands.*"

"This is rendered more serious by the fact that the position of the U.S.A., in the political world of to-day inevitably makes it the main rival to the U.S.S.R., as the centre of attraction for potential leaders of the profession from many lands, particularly the under developed countries. Thus American aid in the Veterinary field, however well meaning and however generous, may well have the unintentional effect of imposing on many areas *an American pattern entirely unsuited to the political and economic set-up of the recipient country, and bias the further development of its Veterinary profession in a way which may ultimately be detrimental.*" (Italics are ours).

Comment is needless.

A NEW DIRECTOR FOR MADRAS

Sri D. Pattabiraman G.M.V.C., A.I.D.I., is fairly well-known in the Veterinary world of India to-day. He is now the new Director of Animal Husbandry Department in Madras, having succeeded Sri V. R. Rajagopalan, who has retired from Madras State Service on super-annuation.

Sri Pattabiraman comes out of an agricultural community with natural bias for Animal Husbandry work. In fact he was often described as a born livestock-man, for his love of animals and intimate knowledge of their breeding and management. He has the added advantage of having risen from the ranks and worked on two of the biggest Livestock Farms in Southern India, viz. Hosur Cattle Farm and the private farm of that famous breeder of Kangayam cattle, the Pattagar of Palayakottai. His knowledge of each individual animal and its pedigree was something to be envied and he rightly earned the appreciation and admiration of the Pattagar. He has a thorough working knowledge of all Animal Husbandry work in progress in Madras State and elsewhere. Besides, Sri Pattabiraman is a man of great tact and pleasing manners and has a knack of

getting on with the general public. He has the necessary initiative and drive to make a successful head of the Department. He has come into power at a time when the Second Five Year Plan is looming large in the eyes of the public. We dare say he has a strenuous period before him and we doubt not he will rise equal to the occasion. We wish him the best of luck in his new sphere of work!

NOTABLE RETIREMENTS

Sri V. R. RAJAGOPALAN.

Madras Veterinary College has the unique distinction of having produced many a Veterinarian of admitted ability and distinction and most of them are the old Diploma holders of a three-year course. We shall not attempt to catalogue the several names that come surging up to our memory. Sri V. R. Rajagopalan, who retired as the Director of Animal Husbandry, Madras, is one amongst them. Besides being a Graduate of the Madras Veterinary College (1924), he took the Post-Graduate academic diploma in Bacteriology of the University of Manchester in 1939. He was attached to the Indian Veterinary Research Institute, Mukteswar as a Research worker continuously from 1924 to 1950, when he was recruited to quite a different type of work, as the head of the Department of Animal Husbandry in Madras. Many were the misgivings about the suitability of the choice but he held that high Office for nearly a period of six years, at a time of revolutionary changes and enforced advancement, under the First Five Year Plan. That he acquitted himself well is beyond dispute and we are happy indeed to note that he re-enters once again into his familiar field of Research as the Director of Livestock Research Station, Patna, after his retirement from Madras. We wish him all success in his new but yet old sphere of work!

Sri P. R. KRISHNA IYER.

Yet another product of the Madras Veterinary College belonging to the same 'old brigade' of Diploma holders is Sri P. R. Krishna Iyer, who like his colleague and contemporary Sri V. R. Rajagopalan at the same Institute, distinguished himself as a Research worker in Pathology and Bacteriology, for well over a period of 33 years. No one could have missed meeting Mr. Iyer at the Indian Veterinary Research Institute and getting the benefit of his advice and guidance, while on a professional visit to that great Institute. He retired as a Research Officer and was an institution by himself. His hospitality to visitors particularly from the South was generous to a fault. After years of absence from home, he must be happy to get back to his residence 'Padmalayam' at Tattamangalam in T. C. State. One of his sons Mr. P. K. Ramachandran, B.V.Sc., M.R.C.V.S., is just entering the Veterinary profession and we hope he will prove worthy of his great father.

We wish Sri P. R. K. Iyer (to use his familiar initials) a well earned rest which he so richly deserves.

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Original Articles

THE BLOOD SUGAR, INORGANIC PHOSPHORUS AND SERUM CALCIUM OF JERSEY CATTLE IN THE PHILIPPINES

By

ARCADIO C. GONZAGA, D.V.M., Ph.D.
*College of Veterinary Medicine,
University of the Philippines, Quezon City.*

and

JOSE S. VERGARA, JR., D.V.M.
E. R. Squibb & Sons, Manila

To improve native cattle and promote the local dairy industry, the Philippines has been importing foreign breeds for quite some time now. Among these breeds is the Jersey, which is gaining favor in many local dairies, because of good production and high quality of milk.

The importation of temperate-zone breeds of cattle has aroused controversy as to its wisdom. While some believe that it is a recourse in the right direction, others, like Gonzalez (9) and Manresa *et al.* (16), claimed otherwise, on the ground that these animals had failed to adapt themselves to Philippine conditions. There are possibly many causes of this failure but, so far, nothing definite has been established.

Pure-bred cattle from temperate regions have been in the Philippines for quite a long time now. Yet, in spite of this, very little studies (8, 15, 16) on the blood chemistry of these animals have been made which may give an insight into their adaptability to local conditions or bring out possible effects of the new environment.

The object of the present study is to determine the blood sugar, inorganic phosphorus and serum calcium of Jersey cattle in the Philippines, to contribute to the meagre data available at present. This may be useful in comparative studies, and may help enlighten us on how well these animals thrive under Philippine conditions.

Materials and Methods

Jersey cattle of the Hacarín Dairy Farm, San Jose, Bulacan, were used in this study. They consisted of seventeen milking cows, 15 Dry Cows and 19 Calves. Of the seventeen milking cows, two were raised on the farm, six were imported December 31, 1946, and the rest arrived November 6, 1948. Among the dry group of fifteen cows, seven were imported in November, 1948, and the rest were born and reared on the farm. All the imported animals came from Australia. The cows varied in age from one year and ten months to seven years and

two months, and the calves, from five months to one year, when this study was conducted.

The animals were pastured on native grasses growing on the farm and fed rations prepared there containing rice bran, ground corn, copra meal, brewer's grain, "binlid", molasses, powdered oyster shell, and table salt. This ration was supplemented with "Manamar", a mineral mixture distributed locally by Gregorio Araneta, Inc. and manufactured by Philipp R. Park, Inc., San Pedro, California, U. S. A.

The blood samples were collected early in the morning before the animals were turned out to pasture. From each animal two blood samples were collected from the jugular vein with the aid of a fifteen-gauge bleeding needle; one of these was allowed to coagulate, while the other was oxalated to prevent clotting. The samples were then taken immediately to the College for analysis.

The uncoagulated blood samples were deproteinized by the method of Folin (6), and the deproteinized fraction used in the determination of the blood sugar in accordance with the colorimetric copper reduction procedure of Folin (5).

The coagulated blood samples were left at room temperature for twenty-four hours to allow the serum to squeeze out from the clot. The serum was separated from the clot by decantation, centrifuged to remove suspended debris, and then kept in a refrigerator until used. The method of Youngburg and Youngburg (30) was used for inorganic phosphate determination. The serum calcium content was determined by the Clark-Collip modification (3) of the method of Kramer and Tisdall (14).

The blood sugar levels in dry cows ranged from 33.11 to 63.29 mg. with an average of 45.03 ± 2.52 mg. and a standard deviation of 11.72 ± 0.15 mg. per 100 cc. of blood. In cows in lactation, the range was from 23.48 to 90.91 mg. with an average of 48.20 ± 0.23 and a standard deviation of 18.39 ± 0.34 mg. In calves, the variation was from 32.15 to 57.14 mg. with an average of 43.43 ± 0.11 and a standard deviation of 7.05 ± 0.80 mg.

The difference in the blood sugar values between lactating cows, dry cows and calves is very little, although there is significant difference between those of lactating cows and calves. The lactating cows had the highest, and the calves the lowest readings.

These observations were contrary to those of Wilson and Hart (29), who observed lower blood sugar levels after normal parturition than before. Reihart (21) claimed that sugar concentrations are highest in heifers. Hewitt (12) found higher levels in heifers and nonlactating

cows. Gonzaga and Manalansan (8), working on Holstein-Friesian cattle under identical conditions as the animals in the present study, found the blood sugar to be highest among calves, whereas in the present work the lowest readings were recorded in calves. The results, however, are in agreement with the observations of Auger (2), and Schwartz and Mezler (25), who claimed that the amount of blood sugar increased with the advance of lactation.

Results and Discussion

The results obtained in this study are shown in Table 1.

TABLE I

Showing the Blood Sugar, Serum Calcium and Inorganic Phosphorus of Dry Cows, Lactating Cows and Calves of the Jersey Breed.

	Dry Cows	Lactating Cows	Calves
	<i>Mg. per cent</i>	<i>Mg. per cent</i>	<i>Mg. per cent</i>
Blood Sugar			
Minimum	33.11	23.48	32.15
Maximum	63.29	90.91	57.14
Mean, P. E.	45.03 ± 2.52	48.20 ± 0.23	43.43 ± 0.11
Standard Deviation, P. E.	11.72 ± 0.15	18.39 ± 0.34	7.05 ± 0.80
Serum Calcium			
Minimum	11.50	10.00	11.50
Maximum	14.09	16.00	17.50
Mean, P. E.	12.63 ± 0.15	12.63 ± 0.34	13.03 ± 0.03
Standard Deviation, P. E.	0.84 ± 0.11	1.99 ± 0.34	1.69 ± 0.16
Inorganic Phosphorus			
Minimum	4.55	5.78	6.38
Maximum	6.94	9.26	10.95
Mean, P. E.	5.71 ± 0.12	7.01 ± 0.18	7.18 ± 0.30
Standard Deviation, P. E.	1.06 ± 0.09	1.06 ± 0.13	3.01 ± 0.23

The blood sugar values reported abroad are variable and are generally higher than those recorded in the Philippines as may be seen in Table 2. The environment may have something to do with the difference.

The amount of serum calcium in dry cows ranged from 11.50 to 14.00 mg. with an average of 12.63 ± 0.15 and a standard deviation of 0.84 ± 0.11 mg. In the lactating group, it varied from 10.00 to 16.00 mg. with an average of 12.62 ± 0.34 and a standard deviation of 1.99 ± 0.24 mg. In calves, the range was from 11.50 to 17.50 mg. with an average of 13.03 ± 0.03 and a standard deviation of 1.69 ± 0.16 mg.

TABLE II

Showing the Blood Sugar, Serum Calcium and Inorganic Phosphorus in the Blood Dairy Cattle as Reported by Some Investigators Compared with Those of the Present Study.

Investigators	Blood Sugar	Inorganic Phosphorus	Serum Calcium	Remarks
	Mg. per cent	Mg. per cent	Mg. per cent	
Anderson <i>et al.</i> (1)	99.22	4.24	12.73	Ave. for Holstein calves.
Dukes (4)	40-60	2.3-9.6	9.12	For cows.
Gonzaga (7)	42.99	—	9.82	Ave. for dry cows.
Gonzaga & Manalansan (8)	40.25	7.26	11.95	Ave. for lactating cows.
	36.42	6.30	12.95	Ave. for dry cows.
Hayden and Fish (10)	48.07	7.67	12.65	Ave. for calves.
Henderson & Van Landingham (11)	46.52	5.70	10.88	Ave. for cows.
Hewitt (12)	—	6.22	—	Ave. for heifers.
Kennedy <i>et al.</i> (13)	60.60	—	—	Ave. for heifers.
Palmer <i>et al.</i> (18)	52.12	5.44	10.90	Ave. for heifers.
	—	7.26	—	Ave. for heifers.
Palmer and Eckles (19)	—	6.48	—	Ave. for heifers.
Palmer <i>et al.</i> (20)	—	—	12.73	Ave. for cows & calves.
Reihart (21)	—	4.85	13.86	Ave. for cows & calves.
Roxas (22)	81.66	5.30	11.42	Ave. for Holstein cows.
Rusoff and Seath (23)	—	4.77	9.37	Ave. for cows.
	—	6.20	10.45	Ave. for cows.
Rusoff and Piercy (24)	—	5.77	10.89	For Holstein & Jersey.
	—	5.03	11.36	Ave. for cows.
	—	6.14	9.95	Ave. for cows.
Teeri <i>et al.</i> (26)	87.40	6.30	11.46	For Holstein, Jersey & Guernsey calves.
Turk and Work (27)	51.22	—	—	Ave. for cows.
Van Landingham <i>et al.</i> (28)	—	6.50	—	Ave. for heifers.
	—	5.25	—	Ave. for dry cows.
	—	4.75	—	Ave. for lactating cows.
Wilson and Hart (29)	75.50	5.55	10.27	Ave. for cows.
Present study	45.03	5.71	12.63	Ave. for dry cows.
	48.20	7.01	12.62	Ave. for lactating cows.
	43.43	7.18	13.03	Ave. for calves.

The serum calcium levels recorded for the groups studied were practically the same. These results are in conformity with those of Anderson *et al.* (1), who found that the difference in the calcium content of the blood of the young and the mature animals were negligible. Reihart (21) made the observation that there was hardly any difference in the serum calcium level between lactating and nonlactating cows. Mercer and associates (17) reported a rise in the serum calcium reading when milking was interrupted. Teeri *et al.* did not find any correlation between age and the calcium of the blood. However, Wilson and Hart (29) claimed that the amount of serum calcium fell after parturition, especially in cows that had lactated before.

The serum calcium readings recorded in this study are within the range of those reported abroad, and practically the same as those reported by Gonzaga and Manalansan (8) in the Philippines.

The concentration of inorganic phosphorus in the blood of dry cows varied from 4.55 to 6.94 mg. with an average of 5.71 ± 0.12 and a standard deviation of 0.68 ± 0.09 mg. In lactating cows, the range was from 5.78 to 9.26 mg. with an average of 7.01 ± 0.18 and a standard deviation of 1.06 ± 0.13 mg. In calves, it varied from 6.38 to 10.95 mg. with an average of 7.18 ± 0.30 and a standard deviation of 3.01 ± 0.23 mg. The calves had the highest inorganic blood phosphorus content and the dry cows, the lowest. The difference between the three groups was very slight, similar to that observed by Gonzaga and Manalansan (8) among the Holstein-Friesian cattle. An appreciable difference was seen between dry cows and lactating cows, and between dry cows and calves. Van Landingham and co-workers (28) claimed that the most important factor affecting inorganic phosphorus concentration was age. According to Teeri *et al.* age was not correlated with the inorganic phosphorus content of the blood.

The inorganic phosphorus readings recorded in the present study approximate the higher levels obtained abroad and are within the range of those observed by Gonzaga and Manalansan (8) for Holstein cows in the Philippines.

Summary and Conclusions

The results of the determination of the sugar, serum calcium and inorganic phosphorus in the blood of Jersey cattle in the Philippines are herein reported.

The blood sugar of the dry cows ranged from 33.11 to 63.29 mg. with an average of 45.03 ± 2.52 and a standard deviation of 11.72 ± 0.15 mg. per 100 c.c. of blood. In the lactating cows, it ranged from 23.48 to 90.91 mg. with an average of 48.20 ± 0.23 and a standard deviation of 18.39 ± 0.34 mg. In calves, it varied from 32.15 to 57.14 mg. with an average of 43.43 ± 0.11 and a standard deviation of 7.05 ± 0.80 mg. These results are, in general, lower than those recorded abroad and a little higher than those observed by Gonzaga and Manalansan (8) for Holstein cattle in the Philippines.

The serum calcium of dry cows ranged from 11.50 to 14.00 mg. with an average of 12.63 ± 0.15 and a standard deviation of 0.84 ± 0.11 mg. In lactating cows, the range was from 10.00 to 16.00 mg. with an average of 12.63 ± 0.34 and a standard deviation of 1.99 ± 0.24 mg. In calves, it varied from 11.50 to 17.50 mg. with an average of 13.03 ± 0.03 mg. and a standard deviation of 1.69 ± 0.16 mg.

The inorganic phosphorus level in the blood of dry cows ranged from 4.55 to 6.94 mg. with an average of 5.71 ± 0.12 and a standard deviation of 0.68 ± 0.09 mg. In lactating cows, it ranged from 5.78 to 9.26 mg. with an average of 7.01 ± 0.18 mg. In calves, the variation was from 6.38 to 10.95 mg. with an average of 7.18 ± 0.30 and a standard deviation of 3.01 ± 0.23 mg.

The serum calcium and inorganic phosphorus values approximated those reported abroad and in the Philippines.

Apparently, the blood sugar concentration was affected by the change of environment of the animals from temperate to tropical, but the serum calcium and inorganic phosphorus seemed to have been not affected at all.

Acknowledgment

The writers are greatly indebted to Don Vicente Araneta for allowing the use in this study of his Jersey herd in the Hacarín Dairy Farm in San Jose, Bulacan; to Drs. Norma Santeco-Baluyut, Primitivo Baluyut and Martin R. Manalansan for their help extended during the progress of the study; and to Dr. Victor Valenzuela of the Institute of Hygiene, University of the Philippines, for his advice and suggestions in the statistical phase of the work.

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earlier than the cattle and the genetic characters can be fixed and transmitted years earlier. The application of A.I. in various countries has been reviewed by Anderson. It has been reported that one ram had been found sufficient to inseminate 1340 ewes in one year (Anderson, 1945). Reports on conception rate with diluted and undiluted semen are contradictory. Whereas good results were obtained with fresh semen, a marked fall was found when semen was stored for more than 12 hours (Quinlan, Steyn and de Vos, 1941). Similar results have also been reported by Dauzier, Thibault & Wintenberger (1954). The Japanese workers Yoshioka, Inudo & Torizuka (1951), however, report the insemination with semen to which diluents had been added, resulted in higher conception rate than inseminations with untreated semen.

GEY has been used for the preservation of semen of various species; bull (Roy & Bishop, 1954), buffalo (Roy, Srivastava & Pandey, 1955), boar and stallion (Roy, 1955). It has been found superior to conventional buffers like EYC and EYP. This dilutor has been found to preserve both motility and life span of ram spermatozoa better than when EYC is used as a diluting medium. It has also been found that addition of certain sugars to GEY help to retard the fall of motility of ram spermatozoa that is evident after about 10 days when preserved in GEY but do not have any significant effect on the total life span (Roy & Pandey). These results and those of fertility trials which have been undertaken, using semen diluted upto 50 times and preserved upto 10 days in this new dilutor, would be reported in due course.

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General Articles

FREEZE DRIED RANIKHET (NEW CASTLE) DISEASE VACCINE AND ITS USE

By

D. R. UPPAL

Indian Veterinary Research Institute, Izatnagar, U.P.

Ranikhet (New Castle) disease of fowls is highly contagious and much dreaded. Though not many outbreaks of the disease are noticed among other birds like turkeys, pigeons, ducks and geese, etc., these species also are susceptible to it. Owing to its wide distribution and the fact that it kills 80-90 per cent of the affected birds, the disease is a serious menace to the poultry industry.

On the lines of research work carried out by Iyer and Dobson (1940) in the United Kingdom an effective liquid vaccine of chick embryo origin was evolved at the Indian Veterinary Research Institute, Izatnagar in 1944, and was released to the field in 1945 after testing it on thousands of birds on the military poultry farms during World War II (Haddow and Idnani, 1946). As the Ranikhet disease vaccine in a liquid form was found to be very sensitive to fluctuations of atmospheric temperature and it could not ordinarily be made available to the remote parts of the country, special messengers had to be deputed to collect the vaccine on ice from the production centre. This proved very inconvenient and expensive. In order to facilitate easy transport of this vaccine and to increase its keeping quality several experiments were undertaken to dry the liquid vaccine in vacuum over certain bases like glucose, paper strips, sand and saw-dust, etc. Experiments on freeze drying of this vaccine using Stokes cryochemical apparatus were undertaken initially in 1949 and encouraging results were reported (Dhanda *et al*, 1951). In India, large scale production of freeze dried Ranikhet disease vaccine could only be taken in hand in 1952 when freeze drying equipments were installed in this country through the courtesy of the F.A.O. of the United Nations.

Materials and Methods

A brief description of the technique of cultivation of the living attenuated Ranikhet disease virus in embryonating eggs and the various stages in the manufacture of the freeze dried vaccine is detailed below.

Fertile eggs are obtained from healthy flocks declared free from infections, especially with *Salmonella Pullorum*. About 50 fresh fertile eggs are set in an electric incubator used exclusively for this purpose.

On the 7th day after incubation they are candled and all infertile eggs and eggs with dead germs are discarded. Eggs are again candled on the 10th day after incubation and well developed vigorously moving embryos are selected for virus cultivation. While candling a mark is made on the egg shell to indicate a suitable site for inoculation purposes. The surface of the shell at the place of inoculation is disinfected. The embryonating eggs are injected through the amniotic sac with 0.1 c.c. of 1:100 dilution in sterile normal saline, of the attenuated virus which has been previously tested for purity. The puncture made at the site of inoculation is sealed with cellophane tape and the eggs are transferred to the incubator. These infected eggs are candled on the following day to detect accidental deaths and, if any, they are discarded. On the second day, the eggs are again candled and eggs with dead embryos are chilled for 30 minutes in a domestic refrigerator. The chilled eggs are placed vertically in egg cups. The eggs are then opened at the air sac. A small quantity of the amniotic fluid is collected and Hemagglutination (HA) spot test is carried out. Examination of dead embryos reveals the presence of multiple petechial haemorrhages in the pectoral muscles and usually also in the skin, while the brain shows gross haemorrhage. (Beveridge and Burnet 1946). The fluid, membranes and the embryo are collected in a beaker and the pooled material is tested for sterility. The harvested material contained in the small beakers and of which HA test is satisfactory is transferred to a deep freeze cabinet at a temperature of -20°C until the sterility tests at 48 hours are known. The stored tissues and the fluids which are satisfactory in respect of virus content are transferred to a cooled sterile Waring blender. The material is blended for five minutes, cooled for thirty minutes in the refrigerator and again blended for five minutes. The suspension is then dispensed usually with a syringe in 0.5 c.c. capacity into special glass ampoules. The vaccine in ampoules is now ready for drying in Edwards centrifugal freeze dryer Model 3PS.

Operation of the Freeze Dryer

The refrigerator of the centrifugal freeze dryer is switched on and when the temperature of the cooling coil has reached -40°C to -50°C , the ampoules containing the liquid suspension of virus are loaded in the centrifuge carrier plate fixed in the primary chamber and centrifuged for 15-20 minutes. The centrifugation, in addition to suppressing the foaming, accelerates drying by increasing the surface area of the material to be dried by causing it to take the form of a wedge against the wall of the ampoules. Combined drain cock and air release valve of the unit is closed and primary drying pump switched on. As the pressure is reduced and the fluid material in the centrifuge freezes, the refrigerator temperature rapidly rises to about -10°C to

-5°C and after a few seconds falls to -35° to -40°C depending upon the quantity of the material being processed. The pressure in the primary and secondary systems is continuously indicated by the pirani gauge attached to the unit. The primary drying is carried out for about 18 to 20 hours and during the course of this period the water vapour that escapes from the material is condensed over the cooling coils of the refrigerator and only dry air and volatile gases pass through the vacuum pump. When the material is sufficiently dry, the vacuum is released and the ampoules removed from the chamber. The bore of the ampoules are now constricted using an oxyacetylene flame to facilitate quick sealing after drying on the secondary system. The constricted ampoules are loaded on the secondary drying headers mounted on a manifold containing phosphorous pentoxide. The manifold is evacuated to a very low pressure by means of a speedivac pump. The drying over the secondary system continues for about 12 hours and the moisture content of the material thus brought to a minimum. On the completion of secondary drying whilst still under vacuum, the ampoules are sealed using a flame of hydrogen gas. The sealed ampoules are then transferred to a deep freeze cabinet at -20°C .

Safety and Potency Tests

A random collection of about 8 ampoules from a batch of 400 ampoules are taken and a stock suspension of 1.100 of the vaccine made with cooled normal saline containing penicillin at the rate of 1000 units per c.c. Then further dilutions of 10^{-3} to 10^{-8} are made using cooled saline. Three or four 10 day old embryonating eggs are inoculated with each dilution of the vaccine in quantities of 0.1 c.c. and the eggs are incubated for 2-3 days and the titre assessed. A cent per cent mortality of embryos invariably occurs in dilution 10^{-6} .

It is our practice to make parallel titration on susceptible birds in dilution of 10^{-5} , 10^{-6} and 10^{-7} using four birds for each dilution. The birds are challenged with virulent Ranikhet disease virus after 10-14 days using two controls. All the birds inoculated with 10^{-6} normally survive. In most cases the titre is assessed as 10^{-7} .

Directions for use

Reconstitution.—The contents of each ampoule should be reconstituted in 100 c.c. of diluent (Sterile distilled water, tap water or normal saline). The ampoules are carefully broken with a file and about 1 c.c. of the diluent is added by means of a syringe and mixed well. Sufficient diluent is added to make up to 100 c.c. and a uniform suspension is ensured by shaking it well. This bulk constitutes the vaccine.

Vaccination.—The reconstituted vaccine is used within two hours after reconstitution. Quantities not used within two hours is discarded.

The reconstituted vaccine should be kept cool and well protected from direct sunlight. The dose recommended is 0.5 c.c. to be inoculated intramuscularly or subcutaneously. A good site for inoculation in adult fowls is under the fold of the skin, inside the wing, or in the case of chicken the leg muscle. Optimum age for vaccination is six weeks and the resulting immunity is practically life long (Seetharaman, 1951).

Reactions in vaccinated birds.—After vaccination birds may be expected to show some drowsiness from the 3rd to 6th day. Later 1-3% of the vaccinated birds may become severely lame or even paralysed. Such birds should be removed to a separate pen and if no signs of improvement are evident within a few days, they should be disposed of for table purposes. Birds showing slight lameness or paralysis require no particular attention as they may be expected to recover in 10-14 days. Ordinarily a casualty rate not exceeding 4% may be expected. If vaccination is done in laying hens, egg production will decline but is expected to return to normal in 14-21 days (Haddow and Idnani, 1946).

Circumstances in which vaccination is contra-indicated

Vaccination should be performed in healthy flocks. It is generally inadvisable to carry out inoculations in the presence of an actual outbreak of Ranikhet disease, owing to the risk of the operator and his assistants transmitting the natural disease in its incubation stage to unaffected birds. However, judicious use of the vaccine can mitigate or control the disease in an actual outbreak. When vaccination in an infected farm is started it should be pushed rapidly to completion taking care that birds in those pens farthest from the pens where the disease started are inoculated to begin with and carried through towards the infected pens to get the best results.

It is advisable to withhold vaccination against Ranikhet disease (a) if some other disease prevails in the area and (b) during hot months. Immunity seems to be established by the 7th to 10th day of vaccination but inoculated birds are protected against natural infection by 'interference' in about 48 hours and such protection persists until the immunity has developed. (Daubney, 1953).

Keeping quality

The freeze dried Ranikhet disease vaccine keeps well for a total period of one month in the ordinary refrigerator (+5°C) or two months in the freezing chamber-10°C of the refrigerator and 7 days at summer temperature or 10 days in the cooler part of the year.

Viability Experiments

EXPERIMENT No. 1

Three ampoules of a batch of freeze dried Ranikhet disease vaccine were packed in a wooden box and despatched on 25-1-54 by post parcel to a customer in Bihar. The parcel was received back on 10-2-54 since it was undelivered. On receipt back at Izatnagar, the parcel was kept in the laboratory at room temperature of about 70°F to 80°F. On 24-2-54 the contents of two ampoules were titrated in fowls in dilution of 10^{-3} , 10^{-6} and 10^{-7} . These birds were later challenged with virulent virus using two controls. The controls reacted well and died on the 4th day of inoculation and typical lesions of Ranikhet disease were observed on post mortem examination. All the fowls under the titration experiment were found immune. Thus the vaccine was found viable and was observed to maintain its original titre of 10^{-7} even after 30 days of exposure to atmospheric conditions, when packed in a wooden box.

EXPERIMENT No. 2

One ampoule of freeze dried Ranikhet disease vaccine referred to in experiment No. 1 above was kept in room temperature till 15-6-54, when another viability test in fowls in dilutions of 10^{-3} , 10^{-4} , 10^{-5} , 10^{-6} and 10^{-7} was carried out. Fowls inoculated with 10^{-6} and 10^{-7} died on challenge. The end titre of the vaccine was found to be 10^{-5} as against its original titre of 10^{-7} . Thus the vaccine appeared to have lost two logs of titre when exposed for 4 months and 20 days (from 25th January, 54 to 15 June, 54) to atmospheric conditions existing then.

EXPERIMENT No. 3

A batch of 125 ampoules of freeze dried Ranikhet disease vaccine was despatched to the Principal, Bihar Veterinary College, Patna on 4-8-54. But through the mistake of the Postal department, the parcel reached Imphal (Manipur) where the vaccine was said to have been kept at room temperature. When the matter came to the knowledge of this Institute the vaccine was called back and received on 1-9-54. Immediately after its receipt, four ampoules of the consignment were titrated in adult susceptible fowls in dilutions 10^{-3} , 10^{-6} and 10^{-7} . All the fowls were found immune on challenge and the controls died of Ranikhet disease. Thus the vaccine was found to have maintained its original titre of 10^{-7} even after exposure for 28 days to atmospheric conditions.

In all the three experiments carried out as above the susceptibility of birds to Ranikhet disease was assessed on Hemagglutination

inhibition (HAI) tests before taking them for titration purposes or as controls.

Summary

An emulsion of the sterile fluids, embryos and membranes of embryonating eggs infected with the attenuated strain of Ranikhet disease virus dried to a frozen state under low pressure constitutes the freeze dried Ranikhet disease vaccine.

The method of freeze drying has provided a potent, cheap and convenient product for the successful control of Ranikhet disease in the country. The freeze dried Ranikhet disease vaccine has better keeping qualities than the wet one and can be transported by post economically.

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OCCURRENCE OF *TRICHOMONAS FOETUS* INFECTION IN INDIA

By

M. S. DAS, P. K. SINHA, AND B. BHATTACHARYA
*Department of Pathology & Preventive Veterinary Medicine,
 Bengal Veterinary College, Calcutta.*

Breeding difficulties amongst cattle have frequently been encountered in India. Besides nutritional deficiencies, frank cases of specific infections have been met with now and then. While abortion has received the most attention in an organised manner with particular reference to survey of the incidence of brucellosis, reproductive diseases as such have not received much attention. It may, however, be stated that on an average 5 per cent of all animals of the breeding age may be permanently sterile, while another 5 per cent suffer periodically from breeding difficulties. The economic loss sustained by organised farms where valuable stocks are maintained in appreciable numbers, must be considerable. The loss in respect of the non-descript and less productive cattle should, also, in the total, assume a large magnitude. As a result, however, of the disease investigation scheme initiated, and

the artificial insemination centres set up, by the Indian Council of Agricultural Research, the necessity of intensifying investigation on sterility, infertility etc. of cattle has come to be recognised as one of major importance in the development of animal husbandry. Thanks to the technical assistance of the F.A.O. and the initiative of the I.C.A.R., Regional Sterility Officers have now been trained and assigned responsibility in the States. At present, these officers are to train staff and carry out survey work in their regions with the assistance of bacteriological laboratories wherever they exist.

Of the different pathogenic agents which are known to play an important role in other countries, the protozoan parasite, *Trichomonas foetus*, has been the source of much trouble in Europe, U.S.A. and other countries. This much dreaded parasite has been recorded in Great Britain, and so far only in one country in Asia — Japan. Workers in India have been on the look out for this parasite for many years and in spite of the repeated searches carried out by a number of workers throughout the country, not a single case was ever detected. The Disease Investigation Officers and those specially trained in protozoology had been making prolonged searches but no flagellated protozoan of this kind had ever been reported in the suspected vaginal material.

In the Bengal Veterinary College out-patient department, and the Artificial Insemination Centre, careful microscopic examinations were carried out by Mr. M. M. Bhattacharya as a routine procedure for more than one year as a result of the Director's personal interest. The results had been consistently negative though thousands of preparations were examined. Some of these suspected materials were shown to Dr. H. N. Ray and the negative results confirmed.

The first positive cases.—In a case of severe vaginitis in a six year old Tharparker cow in the dairy herd of the Bengal Veterinary College, the presence of numerous swiftly moving flagellated organisms were revealed on 22—3—56. The animal had become sterile after the 4th calving. It may be interesting to add that Regional Sterility Officer Sri B. K. Bose has obtained the expert opinion of Dr. H. N. Ray, now Professor of Protozoology of the School of Tropical Medicine, Calcutta, and that the parasite is *Trichomonas foetus* has been confirmed by him.

Again, on 30—4—56, one cow of the same dairy aborted a foetus, 2 months and 7 days old. Microscopical examination of the stomach contents of the foetus revealed no *Trichomonas* nor the parasites could be located in other tissues such as liver, heart and the spleen. Examination of the placental fluid, however, revealed, the presence of frequent *Trichomonas* organisms. Besides these two positive cases several other

cases have been detected by Mr. B.K. Bose, the Regional Sterility Officer, among cows of different breeds — Haryana, Tharparker, Sahiwal etc. belonging to private owners in various parts of the city of Calcutta and its environs. Enquires have been directed to locate the sources of infection in these cases and it appears that stray bulls of the city have been responsible for most of these city cases.

Description of the parasite :—The micro-organisms had a characteristic continuous wavy movement in a zig-zag course. Smears from the vaginal discharge were made, then fixed in Schaudin's fixative and stained with Giemsa. The microscopic examination of the stained preparation revealed numerous pear shaped organisms of 13.6 to 22.4 in length. There were three anterior flagella arising out of the blepharoplast and the undulating membrane extended backwards and projected as a free flagellum near the posterior end. The undulating membrane had 4-6 folds. The axostyle protruded posteriorly beyond the body. The nucleus was large, oval and was placed slightly anteriorly.

It may be added that with a view to eliminate a possible contamination with flagellates of faecal origin samples of faeces were examined, with negative results.

The parasite would, therefore, appear to be morphologically indistinguishable from *Trichomonas foetus*.

Cultural examination :—The vaginal discharge was sown out in various solid and liquid media of which goat serum broth appeared to be the most encouraging. Bacterial contamination was found to be a constant difficulty. Penicillin was, therefore, incorporated in the culture medium but even in its presence, heavy bacterial growth supervened and the *Trichomonas* died out. A combination of Penicillin-streptomycin, however, was helpful. Best results were obtained with the final dilution of 100 I.U. of Penicillin and 200 micro-gram of Streptomycin per c.c. of the medium. The largest degree of growth was obtained between 48-72 hours when the cultures were kept at 37°C. But the growth started to fall off thereafter, although some of the parasites were found to be still alive upto 7 days. Locke's solution with goat serum was, also, used but the organisms tended to disappear early. Subcultures were made in serum broth and a good growth with the dividing forms were seen.

No growth was obtained when the cultures were incubated at 20°C. There was no growth in the starch medium.

Samples of the uterine discharges were maintained at different temperatures to find out the optimum condition under which the maximum viability could be maintained. No living *Trichomonas* were detected when the material was maintained for 24 hours at -4° and -15°C.

Occurrence of *Trichomonas Foetus* Infection in India

By

M. S. DAS, P. K. SINHA and B. BHATTACHARYA

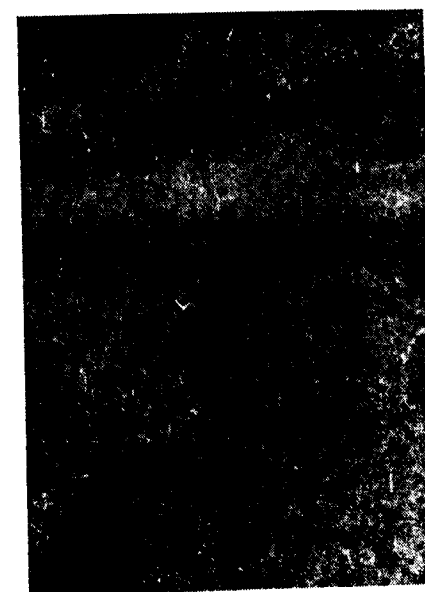


Fig. 1

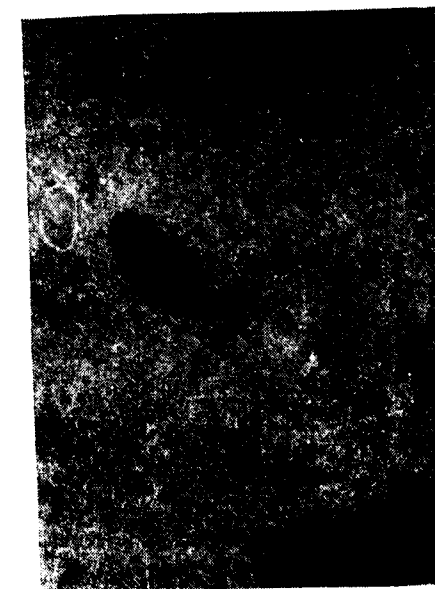


Fig. 2



Fig. 3



Fig. 4

Caecal Trichomonads in a Chick

By
S. N. MOHTEDA

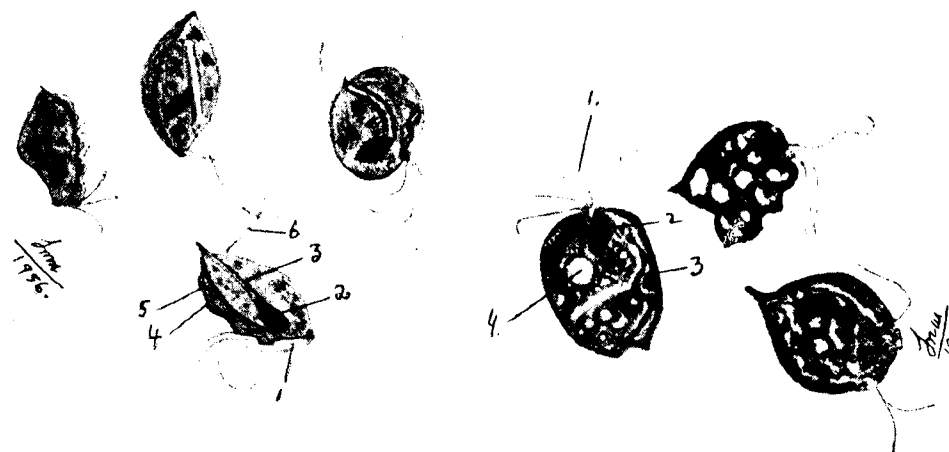


Fig. 1
T. eberthi × 566
1. Flagella
2. Nucleus
3. Axostyle
4. Fibril
5. Undulating membrane
6. 4th flagellum

Fig. 2
Chilomastix gallinarum × 566
1. Flagella
2. Nucleus
3. Undeveloped undulating membrane
4. Vacuolated cytotome.

Trichomoniasis in Pigeons

By
S. N. MOHTEDA

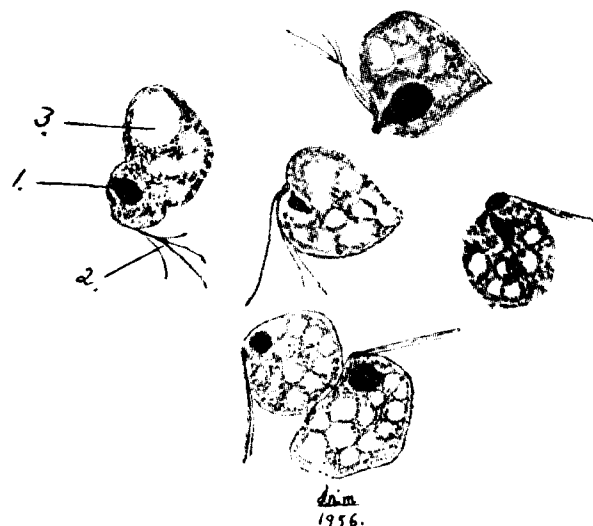


Fig. 1
T. columbae × 970
1. Nucleus
2. Flagella
3. Vacuolated cytotome

[To face pages 34 & 35]

OCCURRENCE OF TRICHOMONAS FOETUS INFECTION IN INDIA 29

Hour to hour examination was not carried out. When maintained at 20°C viable organisms were detected after 24 hours but not after 48 hours. At 37°C the *Trichomonas* were found viable after 48 hours, but not after 72 hours.

Attempts are being made to improve the methods of cultivation and preservation of the organism so that the despatch of clinical material from the field in a suitable condition for laboratory examination could be facilitated. In following these positive cases we have been struck by the erratic manner in which the causative parasites appear or disappear from the external genitalia and discharge of positive cases. This may have been partly responsible for negative results of examination of some of these cases in the past.

Biological tests:—Pregnant guinea-pigs were used. Intraperitoneal and intravaginal administrations of the infective vaginal discharge from the cow were made but with no success. The discharge was also administered intra-vaginally into a cow of 3 months pregnancy. This cow, it may be added, became available as a result of a fractured leg. Vaginal swabs from this cow were found to be negative after the third day. When the cow died after 12 days only patches of inflammatory zones were seen in the vaginal and uterine walls but no *Trichomonas* were detected in the secretions of the vagina and the uterus or in the deep scrapings of the mucose of these organs.

Penicillin and Streptomycin treated inoculum was introduced in the chorio-allantoic membranes of developing chick-embryo without any positive result.

There is reason to believe that Trichomoniasis is probably present in other Indian states also, from which cattle are usually brought to West Bengal in large numbers.

Acknowledgment

We thank Dr. S. Datta, Director of Veterinary Services and Animal Husbandry, West Bengal, for his guidance. Our grateful thanks are, also, due to our colleagues at the Bengal Veterinary College, Messrs B. K. Basu, and M. M. Bhattacharya for supplying us with materials and particularly to Dr. H. N. Ray of the Calcutta School of Tropical Medicine for giving us the benefit of expert opinion.

THE ANTI-BACTERIAL PROPERTY OF GARLIC JUICE

(In vitro studies on some common organisms of Veterinary and Public health importance)

BY

A. MUKHERJEE

and

M. S. DAS

*Department of Pathology & Preventive Veterinary Medicine,
Bengal Veterinary College, Calcutta.*

Previous literature

Garlic is grown all over India and is used chiefly as a condiment and sometimes as a medicine. Information on the chemical composition and medicinal properties of garlic as given by Chopra (1933) shows that the active principle of garlic is a volatile oil which may be readily obtained by distilling the bruised bulbs, and when fractioned, allyl propyl disulphide, diallyl disulphide and polysulphides are obtained. Of therapeutic uses of garlic indicated by Chopra, the following are worthy of brief mention. Garlic juice has been employed externally as an antiseptic in ulcerated surfaces and wounds with satisfactory results. Garlic juice diluted with 3 to 4 parts of ordinary or distilled water (*Succus alli*) has been used as a lotion for washing wounds and foul ulcers. No injury to the tissues is noticed as a result of such application. Internally garlic has been used as a prophylactic against typhus, typhoid fever and diphtheria. Given early in typhoid fever, it will almost abort the disease, and as an intestinal antiseptic it is valuable at any stage of the disease. Garlic is also invaluable in the treatment of Pneumonia. In pulmonary phthisis, garlic and its preparations have been used extensively. Tokin (1943) reports that in Russia garlic has been used as wound dressing with beneficial results. Working with garlic extract, Basu and Sengupta (1946) report excellent results against common pathogens. Bairacli-Levy (1950) studied the prophylactic and curative actions of garlic in bacterial and Virus diseases of canines and sheep, such as Distemper, Hard pad, Streptococcosis, etc. and claim to have cured a large number of such infections by giving oral administrations of raw garlic juice. The same author reports that the American doctors found after hospital tests that in tuberculosis, treatment with garlic gave them their best results, no matter in what part of the body the disease was situated. It was also found to be an excellent intestinal antiseptic. The germ killing property of garlic, according to the

American herbalists, is due to a substance called 'Crotonaldehyde' present in it. Mukherjee and Nilakantan (1951) studied the inhibitory effect of an extract of garlic (Allicin) on the growth of bacteria of Veterinary and Public health importance and found that the extract is active against all the pathogenic bacteria tested, including both gram positive and gram negative organisms and aerobes and anaerobes alike. Gupta (1952) used raw garlic juice and found that it exerts a bacteriostatic action on most of the common bacteria. Gupta *et al* (1952) published another paper on the efficacy of garlic juice in the treatment of ulcers. They observed that garlic juice is definitely useful in the treatment of wounds and ulcers. Golwalla (1953) found that the active principle of garlic, allin, has an antibacterial action on some pathogenic intestinal flora.

Materials and Methods

Majority of workers, cited above, used purified extracts of garlic, obtained by a complex laboratory method or purchased as proprietary drug from the market, for *in vitro* and *in vivo* trials. Such preparations are not easily available and are costly. Garlic juice, which is cheaper and easily available, was used by the present authors in their experiments. Garlic bulbs were purchased from the market in small quantities and stored in room temperature of the laboratory. From a bulb, 3 or 4 lobes were separated out, when required, and their surface scales removed. They weighed about 3 to 3.5 gms. They were then smashed in a mortar and about 3 c.c. of water added during smashing to extract out the juice. The smashed matter was transferred to a muslin cloth and squeezed between fingers. In this way, 5 c.c. juice could be obtained. In spite of straining, there remained lot of coarse matter suspended in the juice. When kept in a narrow tube the coarse matter settled at the bottom, leaving a clear supernatant fluid, but the rate of sedimentation was slow due to the juice being thick and viscous in nature. It was, therefore, centrifuged at 2,000 r.p.m. for 15 minutes, and the clear supernatant fluid was transferred to another tube. This fluid was designated as 'raw garlic juice' and was considered as 100% for making further dilutions.

Gupta (*loc cit*) used serial dilution method which measures the lowest concentration of raw garlic juice that will prevent growth of test organisms in broth. This method was also used by Fleming in 1929 for assaying Penicillin. As the method is laborious and can only be applied to sterile material, Abraham, *et al* (1941) advocated cylinder-plate method in preference to the serial dilution method and since then this method is being extensively used for testing anti-bacterial properties of any unknown antibiotic. Mukherjee *et al* (*loc cit*) adopted cylinder-plate method in their experiments, but used a distillation

product of garlic (Allicin) and not the raw garlic juice. The present authors studied the anti-bacterial property of raw garlic juice, as defined earlier, adopting cylinder-plate method. A summary of the technique is described below. Glass cylinders, each 9.6 m.m. long, 5.1 m.m. internal diameter, 7.2 m.m. outer circumference diameter, with at least one end smooth and levelled, were sterilized and stocked. 14 c.c. of the melted nutrient agar were poured in a 3 inches diameter petridish and allowed to solidify. 24 Hours' growth of the test organisms in broth was poured over the solidified medium and plate was tilted for 30 seconds, so that the medium was seeded uniformly all over its surface with the test organism. Excess of broth was then drained off. The plate was then dried in the incubator at 37°C for 1 hour keeping the plate in its normal position with the lid raised slightly above the height of the rim of the lower dish. On removal from the incubator, glass cylinders were implanted in the medium at suitable intervals with their levelled ends at the bottom. Each cylinder was filled with 0.15 c.c. of fresh garlic juice of different dilutions. The lid was replaced and the plate, with the lid at the top, was placed on a block of wood in the incubator. This precaution helped in preventing excessive evaporation from the medium. After 24 hours incubation, the plate was removed and the diameter of the zone of inhibition around each cylinder was measured. A narrow ring of sediment was invariably found on the top of the medium in each cylinder and this prevented complete diffusion of the garlic juice into the surrounding medium.

With the progress of work, it was decided to compare the anti-bacterial property of garlic juice with that of a standard antiseptic. Penicillin is no antiseptic, as it exerts no direct immediate bactericidal action. Hence, phenol was the choice. Accordingly, 6 inches diameter plate cultures were prepared with 28 c.c. of the melted nutrient agar. One half of the plate was marked as the Phenol side and the other half was marked as the garlic side. The entire plate was seeded with the test organism and the rest of the technique was exactly the same as described above. Each strain was tested thrice with garlic and Phenol simultaneously under identical conditions and the average readings recorded in Table I.

In spite of the limitations of the serial dilution method, it was decided to carry out a series of tests with centrifuged garlic juice in order to compare with the results obtained by Gupta ('*loc cit*') who used Seitz filtered garlic juice in the serial dilution method. It may be noted that the results obtained by the present authors, given in Table II, generally tallied with those of Gupta, thus dispelling the doubt that the active principle of garlic might get absorbed, in any appreciable quantity, while passing through the Seitz filter.

TABLE I

Comparative efficacy of anti-bacterial property of garlic juice and Phenol studied by Cylinder-plate method. Test organisms include pathogens of Veterinary and Public Health importance.

Test organisms	No. of strains tested	Diameter of Zone of inhibition in m.m.							
		Dilution of Garlic juice				Dilution of Phenol			
		Raw	1/10	1/25	1/50	1/10	1/25	1/50	1/100
Staphylococcus aureus	6	45	35	28	18	45	30	24	14
Streptococcus agalactiae	4	32	26	18	12	38	24	20	12
Corynebacterium pyogenes	1	34	30	22	20	40	35	25	20
Bacillus anthracis	2	35	25	22	15	42	34	25	15
Bacillus subtilis	4	25	14	10	×	28	20	12	×
Escherichia coli	3	15	10	×	×	25	22	18	14
Pseudomonas aeruginosa	2	18	12	×	×	30	20	15	12
Salmonella abortus equi	1	25	17	14	10	25	20	15	10
Pasteurella avicida	1	20	18	12	×	30	24	16	12
Pasteurella bovis septica	1	22	15	13	10	33	26	17	10
Proteus vulgaris	2	14	10	×	×	20	14	×	×

TABLE II

Titre in serial dilution method.

(End-point = last dilution showing no growth, i.e., absence of turbidity, after 24 hours' incubation at 37°C).

Test Organisms	Total No. of strains used	Dilutions at which inhibitory effects were observed		
		Complete	Partial	None
Staphylococcus aureus	4	1 in 80	1 in 160	1 in 320
Streptococcus agalactiae	4	1 in 40	1 in 80	1 in 160
Corynebacterium pyogenes	1	1 in 20	—	1 in 40
Escherichia coli	3	1 in 10	1 in 20	1 in 40
Bacillus anthracis	2	1 in 10	—	1 in 20
Salmonella abortus equi	1	1 in 80	—	1 in 160
Pasteurella avicida	1	1 in 80	1 in 160	1 in 320
Pasteurella bovis septica	1	1 in 80	1 in 160	1 in 320
Bacillus subtilis	2	1 in 10	—	1 in 20
Proteus vulgaris	1	1 in 20	—	1 in 40

Summary

(1) Anti-bacterial property of freshly prepared garlic juice was studied separately by cylinder-plate method and serial dilution method against a variety of bacteria including pathogens of Veterinary and Public Health importance. Control tests with Phenol, a standard antiseptic, were done adopting cylinder-plate method. The results showed that anti-bacterial property of garlic juice compared favourably with that of Phenol.

(2) Garlic juice was found to be particularly effective against Penicillin-susceptible organisms.

Acknowledgment

The authors are indebted to Dr. S. Datta, Director of Veterinary Services and Animal Husbandry, West Bengal, and also, to Principal, K. C. Mukherjee for their interest. The help of Sri B. R. Dasgupta, Demonstrator, is gratefully acknowledged.

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TRICHOMONIASIS IN PIGEONS

By

S. N. MOHTEDA, G.M.V.C., P.G., (Mad),
Asstt. Disease Investigation Officer, (Poultry), Hyderabad-Dn.¹

T. columbae, recorded in the upper digestive tract of pigeons revealed to measure to an average of 10 microns in length and 8 microns in breadth almost equal in size to *T. gallinae*, reported by the writer during 1946 for the first time in this country. The rounded form is more predominant than pearshaped and elongated forms and this measures 10 microns in diameter. Under fixed specimens, undulating membrane, basal fibre and fourth flagellum as clearly visible in *T. gallinae*, are

inconspicuous in this species. Parabasal fibril is present but the axostyle is absent. (Vide Plate).

According to Stabler (1938a), the turkey and pigeon trichomonads of upper digestive tract are identical species. It was recorded to cause severe mortality in a flock of 20 squabs raised by a pigeon-fancier in the city of Hyderabad during 1954. On necropsy of two squabs from the infected flock, diphtheretic, yellowish deposits in varying sizes and thickness were found present in larynx, pharynx and oesophagus. Smears made from these deposits showed numerous motile flagellates. The squabs were highly emaciated due to obstruction caused by these lesions in the upper digestive tract. This infection is transmitted to squabs through the 'pigeon milk' during the rearing period by their parents, hence the first 3-4 weeks of squabs' life has been considered more critical and susceptible to this infection. It causes about 80-90 per cent mortality in squabs. This condition is usually brought about under bad hygienic surroundings. Drinking water is the common source of spreading the infection in young pigeons. To prevent this infection in squabs, parents should be treated with some suitable antiseptics before they are allowed to rear their offsprings, or the squabs as soon as they are hatched out, should be segregated from the infected place and raised under artificial conditions. Hinshaw (1937) reports the usefulness of 1:2000 solution of copper sulphate in drinking water of the infected flock.

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CAECAL TRICHOMONADS IN A CHICK

By

S. N. MOHTEDA, G.M.V.C. P.G. (Mad.),
Asstt. Disease Investigation Officer (Poultry), Hyderabad-Dn.

Martin and Robertson 1911 described two species of trichomonads; *T. gallinarum* and *T. eberthi* from the caeca of fowls. These organisms appear somewhat to resemble *T. gallinae* (Rivolta 1878) which was reported for the first time in this country by the writer (1946) causing entero-hepatitis in an indigenous fowl.

The case under report was a Light Sussex chick, 2-3 months old, received in this laboratory for post-mortem examination and diagnosis

of the disease. On necropsy, both the caeca were enlarged about 3-4 times of their normal size. Wet smears made from the caecal contents showed numerous, motile flagellates which on morphological studies were found as follows :—

1. *T. eberthi* (Vide Fig. I.) The organism is elongated and pearshaped. Round form is also present. Undulating membrane runs lengthwise along the surface. Nucleus is placed anteriorly where three flagella arise from the blepharoplast, while the fourth passes back in a wavy line attached along the undulating membrane and becomes free at the posterior end of the organism. A rod like structure, axostyle, runs longitudinally down the middle of body and ends as a spike-like projection in the posterior end. It possesses a strong fibril, passes dorsal to the nucleus and continues almost to the end of body along the base of the undulating membrane. Multiplication by longitudinal fission with components of two organisms was observed.

The comparative measurements of the organism are given below.

	Length		Breadth	
1. Martin & Robertson 1911	9	mic	x	4.6 mic.
2. Tanabe 1926	9-11	„	x	
3. Henger 1929 a	5.14	„	x	2.71 mic.
4. Nieschluz 1936	9	„	x	5 „
5. Richardson 1948	10.5	„	x	5.2 „
6. Writer 1956	8	„	x	7.4-8 „

It will be seen that the organism measures in length to *T. eberthi* but wider in breadth. This organism is considered indetical to *T. eberthi* on account of its fourth flagellum which runs into a free trail at the posterior end with a well developed axostyle.

2. *Chilomastix gallinarum* (Vide Fig. II). It was found as a mixed infection in the caeca of chick with *T. eberthi*. Boeck and Tanabe (1926) described this organism to measure 11-13 microns in length and 5-6 microns in breadth with pyriform body. The cytostome has the shape of a large pouch and extends from the anterior backward to almost middle of the body. There are three anterior flagella and the fourth one vibrates in the cytostome along the border of a small undulating membrane. The action of the undulating membrane is useful in the ingestion of bacteria into the posterior end of the cytosome. Other morphological structures like blepharoplast, fibril, axostyle are difficult to count in this species.

The organism under report is carrots shaped and measures 13-15 microns in length and 10-13 microns in breadth, and is wider.

The nucleus is placed at the anterior end with 3-4 flagella and a small inconspicuous undulating membrane. The cytostome is vacuolated and contains granular substances with ingestion of bacteria. This has also been considered indetical and is being reported for the first time from the caeca of a chick.

The writer feels that chances of developing these organisms in an endemic form are great due to bad hygienic conditions and insanitary surroundings frequently prevalent on a majority of poultry farms and back-yard poultrying. Oral infection with contaminated food and water is favourable for spreading the infection in chicks.

Acknowledgment

The writer is grateful to Dr. K. S. Shetty, Director, Veterinary and Animal Husbandry Department, Hyderabad for his interest in the work.

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UMLACHERY BREED OF CATTLE

By

D. PATTABIRAMAN, G.M.V.C., A.I.D.I.,
Director of Animal Husbandry, Madras.

This is a local breed of Tanjore district. The breed characters are quite well fixed and breeding true to type. It is very popular with the ryots for work purposes. This breed is undoubtedly small but quite suitable for the deltaic areas of Tanjore district and also in adjacent district of South Arcot, particularly in Chidambaram taluk. The bullocks though small are very compact, sturdy and well built and appear to do well as good workers both on the road and in fields.

This breed came to the notice of this department as early as 1941 and measures were taken to form a local committee of non-officials and officials who were all well-versed with that breed, to fix up the definite breed characters for this breed. The characters as fixed and approved by the committee are mentioned below :

Distribution And Habitat

This type of cattle is found mostly in the deltaic taluks of Tanjore district and is very popular locally for work purposes. This cattle though small are very compact, sturdy, well built, thrive on scanty rations and appear to do well, in the wet land areas.

1. General Characteristics

This breed derives its name from the Village of Umblachery in Thiruthuraipundi taluk of Tanjore district. The main tract in and around that village may be considered as the native home of the breed. This breed is now available in the taluks of Thiruthuraipundi, Nan-nilam, Nagapatnam, Kumbakonam, Papanasam, Mayuram and Shiyali of Tanjore district and also in Chidambaram taluk of South Arcot district. The breed is also known as "Jathi Madu" or "Therkuthi-Madu" or "Mottai Madu" and the name "Umblachery Cattle" is best suited for it and should be officially recognised as such.

This is purely a draught breed and the cows are very poor milkers yielding not more than 1 to 4 lbs. of milk a day and on an average the daily average milk yield was 3.8 lbs at the District Livestock Farm, Orathanad during the year 1954-55. Most of the cows are not milked and the calves are allowed to suckle their dams. The cows calve once in 24 months under the existing conditions and the cows are not bred till the calves are weaned. They are semi-wild in nature as they are mostly herded together for manuring the fields.

Bull :—The bull is dark grey in colour, medium in size about 43 inches in height behind the hump on an average and is smart, active and brisk in appearance. The girth and length of the bull are about 62" and 50" respectively. The fore-head is fairly broad with a white star. The face 18 inches long. The horns are about 5 inches long and the length between the horns is 6". All the four legs above the hooves have white marks either "Socks or Stockings" and even a portion of the hooves is white. The switch of the tail is white or partially white. Even a portion of the tail proper is sometimes white at its tuft end. A linear white streak runs on the back of the animal from the hump to the croup. Some have got white marks on both the flanks and on the hump. The animals look very pretty with these markings. The average weight of a bull is about 600 lbs.

Cow :—The cow is dark grey in colour about 42 inches in height behind the haump on an average and weighing about 400 lbs. The girth and length of the cow are about 54" and 45" respectively. The face is 16" long. The horns are about 6.5" long and the length between the horns is 6". The cow has also got white markings on the forehead and on all the four limbs and in the tail, switch etc.

Calves :—The calves born are red or brown in colour with all the characteristics of white markings on the face, on the four limbs and tail. This colour is changed into grey when they are 6 to 8 months old. At this age the male calves that are not required for breeding purposes are usually dehorned by singing with red hot iron. Heifer calves and bull calves considered good for breeding purposes are not dehorned.

Bullocks :—The bullocks are invariably without horns. This is due to dehorning them when they are six months old by red hot iron. Generally they are grey or dark grey in colour with a compact body with all the white markings on the forehead, four limbs, tail, switch etc. The average weight of a bullock is about 600 lbs. and they are very good at work. Normally they have got a working life of 10 years.

2. Head

The head is small and well proportioned to the body.

Fore-head :—Is fairly broad and level, sometimes with a slight groove in the middle. It is not coarse but it is well pronounced with white star.

Face and Muzzle :—Face is short and straight. Muzzle is broad and black in colour.

Eyes :—Are prominent and bright with black eye lashes.

Ears :—Short, erect and laterally placed. (In bullocks the ears are cut at the base).

Horns :—Very small curving outwards and inwards and sometimes spreading laterally. Thick in bulls and thin in cows.

3. Body and limbs

(1) Forequarters

Neck :—Short well set to the body.

Hump :—Medium in size, not fleshy—generally erect.

Dewlap :—Thin and short extending to the sternum. There are white markings on the dewlap also.

Chest :—Broad between the fore-limbs.

Legs and shoulders :—Legs are short, straight and squarely set under the body with white markings—Socks or Stockings, good bone.

Shoulders : are broad and muscular.

Feet : are hard, small and compact. They are partly or wholly white in colour—in some completely black hooves are also found.

(ii) Barrel

Barrel : Well ribbed and medium in length with white markings underneath.

Back : Straight and level with a white streak.

Ribs : are well arched and round.

Naval flap : is very small in cows.

Sheath : is not pendulous and well tucked up to the abdomen.

(iii) Hind quarters

Hind quarters are well developed and drooping.

Loins and hips : Loins are short and broad. Hips are wide apart.

Rump and Pin bones :—Rump is inclined towards the tail end. Pin bones are wide apart.

Flanks : fairly white and sometimes with white markings.

Thighs, buttocks and hocks : Thighs are fairly muscular, Buttocks well set and rounded. Hocks are strong and compact.

Tail : Tail is long and tapering gradually below the hock.

Switch : is white or partially white.

4. Udder, Teats and Milk veins

Udder :—is small.

Teats :—are very small and squarely placed.

Milk veins :—are not well pronounced.

5. Skin, hair and escutcheon

Skin :—is soft and gives a glossy appearance. The skin is black in colour.

Hair :—is very short and gives a glossy appearance to the coat, generally grey or dark grey in colour.

Escutcheon :—is not well marked.

As this local breed was found to be fast deteriorating, due to neglect of the ryots and malnutrition, the department found it necessary to take measures to salvage a few good animals and to improve them by selective breeding by opening a farm in that area itself. On 25-7-1954, the District Livestock Farm, at Orathanad in Tanjore District was inaugurated by the Minister for Agriculture, Sri M. Bhakthavatsalam,

by taking over the lands and buildings available of the Chattram department of the District Board, Tanjore. 50 Cows and heifers were purchased from reputed local breeders in the actual breeding tract of this breed and they now constitute the foundation stock of this farm.

Average measurements of typical Umlachery animal in inches.

	Male			Female		
	Maximum	Minimum	Average	Maximum	Minimum	Average
1. Height behind hump	49	42	45½	46	35	40½
2. Length from point of shoulder to pin-bone	57	42	49½	50	38	44
3. Length of quarters from angles to pin-bone	17	12	14½	15	12	13½
4. Height of angle of hip	50	42	46	45	36	40½
5. Width between angles of hip	16	12	14	16	8½	12½
6. Length of tail and length of end of switch from ground	42 12	32 4	37 8	44 12	32 4	38 8
7. Girth	66	54	60	58	48	53
8. Height of point of elbow	28	23	25½	25	20	2½
9. Measurement of bone below knee	12	10	11	12	8	10
10. Length of face from occipital crest to upper edge of muzzle	20	15	17½	16	13	14½
11. Width of face immediately above eye	14	7	9	8	5	6½
12. Slope of the Rump	14	10	12	13	10	11½
13. Thickness of horns at base	9	6	7½	9½	5	7½
14. Length of tail up to switch	34	20	27	30	18	24
15. Body weight	810 lbs.	446	628	560	292	426

It is now exactly a year since they were introduced on the farm and they look very pretty now with good condition. They respond well to good feeding. The cows show a good yield of milk and it is astonishing to find some of them yielding as much as eight lbs. a day.

**'PULLET DISEASE' IN THE EXPERIMENTAL POULTRY FLOCK
AT THE MADRAS VETERINARY COLLEGE***

By
Bertie A. D'SOUZA,
Department of Animal Husbandry,
and
K. P. CHANDRASEKHARAN,
Department of Pathology,
Madras Veterinary College.

Introduction :—Under the designation of 'Pullet Disease' Avian Mono-cytosis (Jungherr and Matterson, 1944), Blue comb, X disease (Beaudette, 1929), Contagious indigestion (Waller *et al*, 1942), Battery nephritis, Brights' disease (Wearer, 1941), Hepato-nephrosis (Jungherr and Levine, 1941), Coli-bacillosis (Wearer, 1941), Tom Barron's disease and Avian infectious diarrhoea (Mochizuki, 1951), a number of workers have described an acute disorder in young laying birds with many features of an infectious disease. It has not been possible to reproduce the disease and though a viral agent has been isolated in two instances, the etiological association of the agent with spontaneous disease is still uncertain. Majority of the outbreaks have occurred in United States of America. Also diseases similar to the so-called 'Pullet disease' have been reported from England (Gordon and Blaxland, 1945) and from Japan (Mochizuki, 1951). However, while much information in regard to clinical and pathological aspects of disease are known, as yet very little definite knowledge concerning the etiological aspects, mode of affection, control and prevention are available.

An outbreak of a disease, which on grounds of epizootology, clinical features and pathology resembled the so-called 'Pullet disease' is recorded here, we believe, for the first time in this country. The outbreak occurred in one of the flocks in the college experimental poultry unit which then consisted of 50 pullets resulting in a loss of ten birds. Such a loss in a promising flock of birds is disappointing, and is a serious economic loss. It is sure to damp the enthusiasm of any poultry farmer especially as the disease affected only the best young birds. The object of this note is to bring to the notice of workers in poultry industry the existence in India of such a disease hitherto probably little noticed. There is also evidence from the history and histo-pathological examination of diseased poultry material from isolated field cases to suspect that the disease is occasionally met with in

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**'Pullet Disease' in the Experimental Poultry Flock
at the Madras Veterinary College**

By
BERTIE A. D'SOUZA and K. P. CHANDRASEKHARAN.

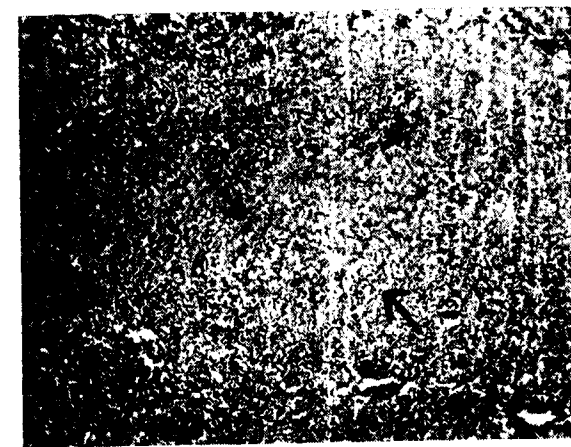


Fig. 1
Section of the liver to show an area of necrosis. This on gross examination appeared as a white 'spot' (Low power objective, x6 eye piece Leitz - H & E).

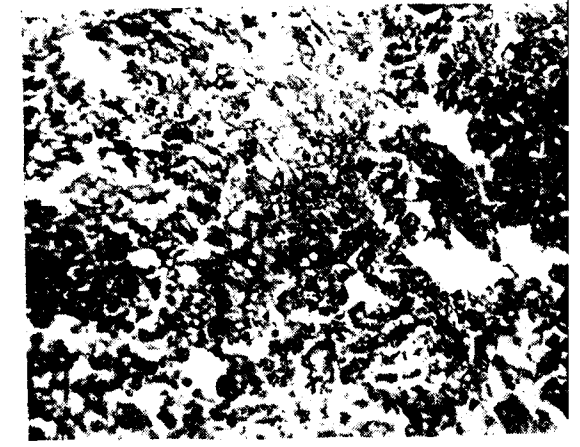


Fig. 2
Same as in Fig. 1 at higher magnification (High dry, x6 eye piece - Leitz. H & E).



Fig. 3
Breast muscle to show patchy hyaline necrosis, swelling and loss of striation. (High power, dry objective, x6 eye piece, Leitz. H & E).



Fig. 4
Kidney to show extensive degenerative changes tubules. (High power dry objective, x6 eye pi Leitz. H & E).

'Pullet Disease' in the Experimental Poultry Flock at the Madras Veterinary College

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BERTIE A. D'SOUZA and K. P. CHANDRASEKHARAN.

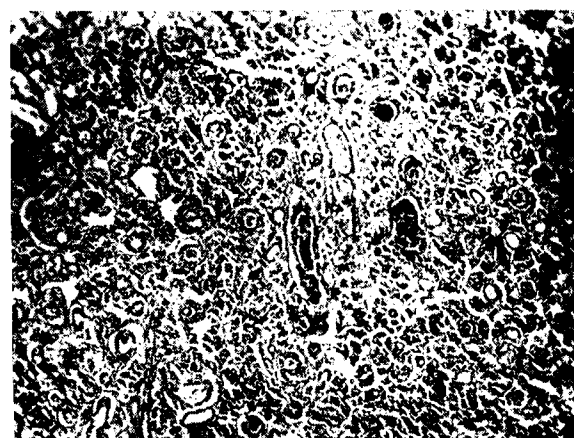


Fig. 5

Kidney to show inflammatory cells in the tubules and detachment of tubular epithelium from their basement membranes.
(Low power objective, x5 eye piece. Leitz. H & E.)

"Umblachery Breed of Cattle"

By

D. PATTABIRAMAN, G.M.V.C., A.I.D.I.



UMBLACHERY COW



UMBLACHERY BULL

'PULLET DISEASE' IN THE EXPERIMENTAL POULTRY FLOCK 43

other parts of the State. At a time when the country is preparing to launch a very ambitious programme of expansion in poultry industry under the Second Five Year Plan, it is considered a discussion on a malady affecting, as it does the best laying birds in the prime of life, would be of topical interest.

2. *History of the flock and other pertinent data (which have a bearing on the outbreak):* The flock in which the disease occurred consisted of 50 R.I.R. pullets raised in the college, whose ages varied from 5 to 9 months. The birds were fed with grains (wheat or cumbu) at the rate of 2 ozs. per head, mash made of wheat flour 15 parts, wheat bran, rice bran, groundnut oil cake and fish meal, each 20 parts and Churn brand mineral mixture (I.C.I.) 5 parts, 2 ozs. per bird. In addition, chopped lucerne was fed daily and occasionally raw whole blood. This diet is given to the chicks from 2½ to 3 months onwards and on this feed, a very satisfactory increase in growth rate was obtained in all birds. All the birds that died showed good growth rate and compared very favourably with the others in the lot.

3. *Clinical history, symptoms, course and incidence:* In all 10 deaths occurred, nine during the months of October, November and December 1955 and one in the month following. The one that died in January 1956 took ill much earlier, but showed a protracted course with Terramycin treatment. In between deaths often there was an interval varying from few days to little over a week and as this records the first manifestation of this infectious disease in this flock, it is too premature to state whether the disease is seasonal or not. The mortality worked upto 20 per cent as at the time of outbreak there were nearly 50 pullets in the flock.

The onset of the disease was sudden and the affected, with one exception, were laying birds in very good condition. They became dull, listless and refused feed. All showed severe cyanosis of the comb and wattles and this persisted till death. In almost all there was rise of temperature to 110°F. and a whitish to watery diarrhoea was constant symptom. Indeed, in some cases the thin watery motions were so incessant that it dribbled continuously and soiled the ground below and the feathers around the vent. They were quite disinclined to move and crouched themselves in one place with half closed eyes and died usually in 24 to 48 hours. In three instances, the course was rapid, birds in apparent healthy condition were found dead in the house the next morning. In two cases nervous symptoms in the form of tremors of the head were noticed before death. Two birds (Nos. 2092 & 2099) showed abatement of symptoms for a few days under Terramycin treatment, but succumbed later. Also bird No. 2032 had a much protracted course on treatment with Terramycin.

Full particulars of the birds dead are given below :

S. No.	Bird No.	Date of first laying.	No. of eggs laid.	Age at death.	Date of death.	Remarks.
1.	2023	2-10-55	4	8 months.	6-10-55	(Destroyed in extremis.)
2.	2017	15-7-55	47	9½ "	8-10-55	
3.	2052	21-7-55	3	8½ "	11-10-55	
4.	2078	20-10-55	4	6 months 8 days.	17-10-55	Treated with Terramycin.
5.	2087	25-10-55	1	6½ months.	31-10-55	
6.	324	12-9-55	7	8 "	1-11-55	
7.	415	—	—	5 "	1-12-55	
8.	2092	3-11-55	24	8 months 22 days.	14-12-55	
9.	2099	28-11-55	11	8 months.	27-11-55	
10.	2032	16-7-55	77	1 year.	17-1-56	

4. *Autopsy appearance*:—All birds were well nourished and two or three actually showed a tendency towards obesity. Most of them showed evidence of dehydration, palidity of skeletal muscles especially of the breast muscle with occasional small haemorrhagic streaks. Costal pleura in 5 cases were petechiated and lung oedematous in 2 cases. *Heart* in one case showed small whitish spots which are evidently areas of degeneration. In six instances *liver* showed a number of yellowish-white spots, each of 1-2 m.m. diameter involving both the surface and the substance. In one case it was friable and fatty, while in two instances it was merely studded with petechial spots. In no case was there any evidence of enlargement. *Spleen* in all cases were about normal in size, but in many instances, the capsule was tense with congestion of the pulp. In three cases (Nos. 2092, 2099 & 2032) all of which had the protracted clinical course, the *kidneys* were much enlarged generally pale but with diffuse light red areas on the surface. The anterior lobe in all cases appeared to be involved most, as this showed the greatest enlargement. In one case in addition, there was dilation of the ureters with plenty of whitish material, evidently engorged with urates. The gross appearance of the kidney in other cases were normal. *Intestines* in all cases showed varying degrees of catarrh with thick mucus filling the lumen. In many instances *Ascaridia galli* were present in very small numbers, but these cannot possibly account for the catarrhal changes seen constantly. The *ovary* in most cases showed varying degrees of congestion, while in some it was soft and showed a peculiar tendency to run out on slight manipulation. In one case four pedunculated shrunken ova each of play-marble size were seen dropped in the abdominal cavity. *Blood picture* especially in those that died of acute disease, showed a large number of monocytes many of which were immature. Unfortunately, no counts were taken as at the time of death, in fact no pullet disease was suspected. But

any one examining the smears doubtless would be struck by the overall increase in this type of leucocyte, and even on a conservative estimate one should think at least in respect of 3 or 4 cases, the number would not be anything less than half the total number of the leucocytes. In others the monocytes were not so numerous and in respect of the sub-acute types with kidney lesions the number would not range beyond 10-12 per cent of the total leucocytes.

5. *Histo-pathological examination* :

Liver:—Excepting three cases, all others showed focal necrosis of the organ, the extent and degree of involvement of course varying from case to case. Necrosis showed no zonal orientation, but corresponded in respect of large ones to those observed grossly as 'spots'. (Figs. 1 & 2) The changes undergone by hepatic cells in these necrotic areas varied from mere cloudy swelling to actual disappearance. There was no infiltration into these areas with any type of inflammatory cells. In one case, the liver showed diffuse vaculation and inceptant fatty changes, whereas two showed mere congestion.

Spleen:—Two cases showed minute foci of necrosis while in many cases plenty of blood pigment were seen in the phagocytic cells of the pulp. In few cases some degree of reticulo-endothelial hyperplasia was evident.

Heart:—Patchy areas of fragmentation of muscle fibres and partial loss of striation.

Skeletal muscles (of breast): Fragmentation, loss of striation and swelling of fibres were the constant changes in the sections examined. Due to hyaline necrosis (Zenker's degeneration) the fibres were much swollen and seen as mere uniform eosinophilic sheets on H & E staining. The distribution of the changes were always patchy. (Fig. 3.)

Kidney:—Microscopic changes in the kidney varied greatly. In some cases there were mild degenerative changes involving occasional tubules and partial detachment of the tubular epithelium. In others the changes were more widespread, many showing complete detachment from basement membrane, severe degree of degenerative changes and damaged to tubular epithelium, presence of granular eosinophilic material inside the damaged tubules and occasional presence of hyaline casts inside the tubules. (Fig. 4). In those cases that showed enlargement of the kidney on gross examination, there were widespread tubular dilatation with presence of inflammatory cells within. Also the degree of tubular damage was more severe and inflammatory oedema in the inter-tubular tissue especially of the medullary portion, were present. (Fig. 5). Concurrently in one of these cases, necrotic areas were seen in the

medullary area with mono-nuclear and giant cell infiltration, a feature reminiscent of the usual picture in gouty nephritis.

6. *Bacteriological and other examinations done (to establish the nature of the disease):*

(i) Bacteriological examination of heart blood, liver and intestinal contents were done in all cases on plain broth, plain agar, tetrathionate broth and MacConkey's agar and in some case in blood agar also. After incubation for 48 hours, a search was made for any pathogenic bacteria. In respect of growth in tetrathionate broth, plating was further done on desoxycholate agar to detect specially any *Salmonella* organism. In no case could we detect *Salmonella* organisms from any of the tissues examined. In two instances bacteria belonging to the group of *Coli-aerogenes* were obtained from heart blood and liver in pure cultures, whereas in others, heart blood cultures were negative. Liver in some cases and intestinal contents in all instances yielded organisms belonging to *Coli-aerogenes* group.

(ii) In order to test whether any transmissible agent was involved, 1 c.c. of 1 in 100 pooled emulsion of fresh materials (liver, spleen and lungs) from a typical case (bird No. 324) was injected into 2 susceptible adult birds. 1-2 ccs of the same material was also fed to them. The birds were kept under observation for over two weeks and none got sick during the period and after.

Since a few birds showed some nervous symptoms at the terminal stages, a group of young mice were given 0.05 c.c. of the centrifuged material intracerebrally to find out whether any viral agent with affinity for central nervous system, was involved in the outbreak. But none of the inoculated mice became sick during the one month period they were kept under observation.

Discussion

The clinical history, symptoms and pathological features presented in the cases resembled greatly the description given under the so-called 'Pullet disease' in the literature. The sudden onset of the disease, especially affecting pullets in good condition which have commenced to lay, watery diarrhoea, cyanosis of the comb and wattle and the rapid course of the disease, are all the characteristic clinical features of the disease according to Jungherr (1952), Beaudetta (1929) and others. All the cases seen here, especially the ones that died with an acute course showed the above features. Even in the last three cases wherein the life of the birds was prolonged through a longer course of the disease under Terramycin treatment, they showed some of the above mentioned clinical features of the disease in the early stages. We believe that, but

for the early administration of Terramycin they would have died in the acute phase like the other birds. Thus from the anamnestic data presented here, no other disease could possibly be suspected to any careful observer.

The pathological features of the disease also points to the recognition that the disease under investigation is one of Pullet disease. Taken together, most of the gross and microscopic features usually described in this disease, namely, extreme adipose condition of the abdominal fat, petechiae on the fatty tissue and serous membrane, 'spottiness' of the liver, pallor and patchy degeneration of the breast muscles and the degeneration of tubular epithelium, were present in the cases examined here, though obviously none would expect to find all the above changes in every case. However, we did not find 'chalky white' areas in the pancreas and in the renal tubules the 'pseudo-giant' cells, mentioned by Jungherr. The absence of these features however do not invalidate our conclusion as many other features highly characteristic of the disease were present in the cases recorded. One other important feature of the disease stressed by Jungherr, namely increase in monocytes of the blood, has been noticed especially in cases that died with an acute course. Although no actual counts were taken, it was quite evident in every case examined that there was an unquestionable increase in this type of blood leucocytes.

Thus, all the above-mentioned features taken together establish that the disease entity under investigation is the so-called 'Pullet disease'. However, we have constantly kept in mind the possibility of other diseases and have taken some pains to eliminate other known diseases before venturing to report the existence of this new disease entity hitherto unrecorded in this country. Thus bacteriological examination was done to eliminate *Salmonellosis* in every case. The possibility of Avian leucosis complex occurring either alone or complicating this affection was adequately investigated. In this connection, it may be mentioned that Avian leucosis complex often shows a more protracted course resulting in severe emaciation and loss of weight. All the birds here were in very good condition and in fact, the affected were those with the best growth rate from hatch. There was no case of Avian leucosis complex in the college flock since its inception in November 1954. However it may be pertinent to state that at least in some of the early cases, observing in the blood smears great increase in mono-nuclear cells especially that of the immature ones, which greatly resembled those of the lymphoid series, did we look for the possibility of leukaemic form of Avian leucosis complex. But on further observing the autopsy picture and studying the histological sections, this possibility was dismissed. Again the history of the flock in respect of

Avian leucosis complex did not lend support to the contention that the disease under investigation was in any way connected with Avian leucosis complex.

Although the flock was protected against Ranikhet disease by the freeze-dried chick embryo vaccine, the possibility of breakdown of immunity in the flock was considered at the time of mortality among these adult birds. But none of the birds showed any usual lesions associated with the disease in adults, nor did we find concurrently the disease in any of the unvaccinated susceptible birds in the same premises.

The bacteriological and other examinations done adequately prove that *Listerella monocytogenes* as an etiological agent was not involved in the condition described here. In birds, Listerellosis being a septicaemic affection, failure to isolate this organism (as for that matter any gram positive bacteria) in blood agar medium shows that this organism was not concerned. Nor could we find any bacteria in the smears and sections from these cases. The absence of necrotic lesions in the heart muscles which is considered by workers as characteristic of Avian Listerellosis, confirms that these birds did not die of Listerellosis.

Discussing the etiological factors associated with the disease, Jungherr (1952) cites the work of Waller (1942, 1944) and Watanabe *et al* (1952) to show that a viral agent in developing chick has been isolated from cases of so-called Pullet disease. But none of the above workers appear to have reproduced the disease by experimental inoculation of the virus so isolated. The negative results obtained by attempts to reproduce the disease also showed that even if any specific infective agent was involved, the disease is not one which could easily be reproduced. Jungherr also appears to hold the view that the viral agent associated with the disease might probably be widely present in the susceptible population and that some non-specific factor might be necessary to bring out the latent disease in a clinical form.

The nature of affection of the kidney especially in the protracted sub-acute forms as seen in three instances, shows that it is possible that some inapparent or abortive cases may pass off insidiously to the condition familiarly known as "Visceral gouty nephritis". Thus unless one looks carefully for the cause of earlier deaths in a farm, this condition may not be fully correlated with Pullet disease and the relation between the two diseases may not be quite apparent. This study greatly lend support to the widely held contention that gouty nephritis and Pullet disease are much related and that gouty nephritis might only be a sub-acute or chronic expression of Pullet disease.

A few trials at treatment with Terramycin showed that this antibiotic is effective in bringing about an improvement in clinical symptoms and offering some relief.

In conclusion, we wish to stress that outbreaks like the one reported here are apt to occur in the field and they deserve proper investigation by the staff of the Animal Husbandry Department.

Summary

1. An outbreak of so-called 'Pullet disease' or Avian monocytosis in a flock consisting of 50 pullets causing mortality in 10 birds is reported for the first time in India. The possible existence of this disease in the field is indicated.

2. The incidence, epizootology, clinical symptoms and pathology of the disease are described. In general they resembled those described by other workers.

3. Transmission experiments done on a limited scale showed that the disease is not transmissible.

4. Various examinations done to negative diseases such as Salmonellosis, Avian leucosis complex, Ranikhet disease, etc. and to establish the diagnosis as 'Pullet disease,' are described.

5. Terramycin in doses of 62.5 mgm. per day gave only abatement of symptoms and temporary relief.

6. The possible role of a viral agent in the disease and the relationship of this disease to gouty nephritis are discussed.

Acknowledgment

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digestion of Loeffler's serum, gelatin liquifaction, absence of growth of McConkey's etc. In the case of samples which showed the presence of gross blood in milk and which did not yield a pathogen in the first attempt, material was also obtained for the second time and subjected to cultural examination. Examination of 27 samples from different cases of Mastitis showed the causal organisms as follows.

- | | | |
|-----------------------|-----|--------------|
| 1. Streptococci | ... | 7 cases. |
| 2. Staphylococci | ... | 2 cases. |
| 3. <i>C. pyogenes</i> | ... | 10 cases. |
| 4. Coli-form bacteria | ... | 1 case only. |
| 5. No pathogens | ... | 7 cases. |

It would be convenient to discuss important features of each group separately.

1. *Streptococcal Infection* :—Out of six cases of Mastitis caused by Streptococci one case showed a very typical change caused by *Str. agalactiae*. The quarter was markedly atrophied and indicated chronic infection of a long duration. The character of the milk was altered and was typical. In this particular case the milk was thin, watery and when kept in a centrifugal tube fine clots settled to the bottom in a large column, giving the supernatant a whey-like appearance. *Str. agalactiae* was isolated. The organism gave all the reactions of *Str. agalactiae* including the hippurate test. Streptococci from the other cases however were not typed further.

2. *Staphylococcal Infection* :—Both the cases showed an acute inflammation.

3. *C. Pyogenes Infection* :—Of all the groups this group comprises the most important type of cases. All the cases showed an acute inflammation. The udder was swollen and painful. The secretion was thick purulent and invariably contained blood. With penicillin treatment the quarter showed little improvement. Infection by this organism resulted in a complete loss of the quarter. *C. pyogenes* was isolated in pure culture in all the cases. Though the number of cases studied is too small to come to any conclusion, it appears that cases of *C. pyogenes* infection are fairly common. In at least four cases there was a history of wound on the teat caused by barbed wire fencing. These untreated wounds ultimately infected the quarter. Penicillin has no action whatsoever on this organism and an effective antibiotic is absolutely necessary. One case was treated with two intramammary infusions of Terramycin without any clinical improvement. Secretion obtained after the treatment yielded the organism in pure culture. It is not intended to draw any conclusions on the efficacy of Terramycin in *C. pyogenes* infection since only one case has been treated.

4. *Coli-form bacteria* :—Only from one case Gram-negative bacilli were isolated. The inflammation was acute. Secretion was removed with great difficulty. It was felt that Penicillin will have no effect on this organism. The case could not be followed up as it was discontinued.

5. *No pathogens isolated* :—As already mentioned this group included cases which showed presence of blood in milk without any inflammatory changes in the quarter. In one case however there were slight inflammatory changes in the quarter and the secretion consisted of whole blood with clots but cultural examination did not yield any pathogens. The secretion was obtained for the second time and inoculated on blood agar but there was no growth. It is not possible to explain the cause of such a condition.

The treatment aspect :—In the present study of mastitis the work was not merely of a diagnostic nature but efforts were made to follow the cases during treatment as far as possible. Since the availability of penicillin for intramammary infusion, it has become almost a routine measure to inject penicillin irrespective of the causal organism. This procedure is justified because the practitioner cannot afford to wait till the Laboratory result is sent to him and he has to adopt some form of treatment during that period. In the case of all acute inflammatory conditions involving a lactating udder it is seen that due to inflammatory changes the animal resents manipulation of the udder with the result that the milk is retained in that quarter. The swelling becomes marked and the retained milk is probably used to the greatest advantage by the invading bacterium. This forms a vicious circle in that the quarter is not emptied because there is inflammation, and inflammation does not subside since there is milk to support the growth of the bacteria.

Now under such circumstances it is essential that the quarter be emptied before any treatment is attempted with any of the antibiotics. Clinicians will agree that emptying the quarter in such cases is not a simple matter and any amount of manipulation will not remove the clotted milk completely. In such cases the use of oxytocic principle has been suggested. Schipper (1953), used purified oxytocic principle in over fifty cases of clinical mastitis with a dose of ten to forty units. He describes the actions of the oxytocic principle as follows :—

1. Removes residual milk.
2. Removes in great part inspissated secretion from milk ducts.
3. Renders effective penetration of antibiotics which are infused in the quarter.
4. Aids in obtaining production of normal milk at an early date.

It is therefore evident that there is a distinct advantage in emptying the udder as described above and then using the intramammary infusions.

Coming to the choice of a drug it is clear that the drug or drugs chosen should have an action on a variety of bacteria, because the clinician has to start the treatment immediately without even waiting for the laboratory result.

Florestano (1955), suggests the use of antibiotic-sulphanamide mixture.

Summary

1. 27 clinical cases of mastitis studied from the aetiological point of view.
2. Many of the cases were followed as far as possible during and after treatment.
3. Infection by *C. pyogenes* seems to be fairly common.
4. Few important aspects of treatment discussed.

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STUDIES ON REPRODUCTION IN THE INDIAN BUFFALO A PRELIMINARY NOTE

By

C. KRISHNA RAO¹ and T. MURARI².

While studies on the various aspects of the physiology of reproduction in the cow have been numerous and quite comprehensive similar studies with regard to the buffalo have been rather few and superficial in nature. Work on the reproductive behaviour of the Indian buffalo is very scanty. The buffalo is recognised as the best

1. Deputy Director of Animal Husbandry, Andhra, Madras-8.
2. Director of Animal Husbandry, Andhra, Madras-8.

dairy animal in India and its efficiency as an economic milk producer depends very much on its reproductive efficiency. It is, therefore, considered that studies on the various aspects of the physiology of reproduction are of fundamental importance. The records of the Dairy-cum-Bull Farm, Waltair were utilised for this study. All the animals studied belong to the Murrah breed. The following is a brief account of the findings:—

1. *Gestation Period* :—Jennison (1927) reported 300 days as the gestation period for the Indian buffalo. Kaleff (1932) reported 316.1 days for the European buffalo and Kanagaratnam (1935) reported 315 days for the Malayan buffalo. For the Egyptian buffalo Pissarewsky (1935) reported 310 days, Maymone (1942) 311 days and Badreldin (1948) 317 days as the length of the gestation period. Ragab and Asker (1951) working on Egyptian buffaloes reported 317.5 days for the male calves and 315.8 days for female calves. Arunachalam, Lazarus and Anantakrishnan (1952) found the average gestation period for Murrah buffaloes to be 305.1 days for male calves while it was 305.4 days for female calves. They found that the sex of the calf as well as sequence of calving had no effect on the gestation period.

A total of 191 animals were involved in the present study and 302 gestation periods were analysed. The average gestation period worked out to 310.4 days. The sex of the calf did not appear to affect the length of the gestation period.

2. *Distribution of Calvings During the Year* :—Ragab and Asker (1951) reported that 96 per cent of the Egyptian buffaloes calve between August and March. Arunachalam, Lazarus and Anantakrishnan (1952) found calving of Murrah buffaloes to be most frequent in the months of October and November and least in February and April.

In a similar study on the seasonal distribution of buffalo calvings involving a total of 523 calvings, it was found that 77.6 per cent of all calvings occurred during the months from June to December. September to December were the months of heaviest calving and contributed to 50 per cent of the total calvings. February to May were the leanest months of calving and contributed to 16 per cent of the total calvings.

3. *Birth Weight of Calves* :—Villegas (1939) stated that the average birth weight of Indian buffalo calves in Philippines was 75.2 lbs. Arunachalam, Lazarus and Anantakrishnan (1952) reported Murrah buffalo calves to weigh 73.2 lbs. at birth. These workers found that the sex of the calf did not influence the birth weight. Asker and Ragab (1953) reported the average birth weight of Egyptian buffalo calves as

38.5 kilos. They also reported that the sequence of calving affected the birth weight of buffalo calves significantly.

A total number of 556 calves born to 282 buffaloes gave an average birth weight of 73.1 lbs. per calf. Male calves weighed 74.4 lbs. on the average and female calves weighed 71.9 lbs. The heaviest calf was a male and weighed 110 lbs.

The effect of the age of dam on birth weight of calf was studied in 67 animals for the first three calvings. There was a progressive increase in birth weight of calves from the first to the third calving. First calves weighed on the average 68.1 lbs., while the second and third calves weighed 72.2 lbs. and 75.3 lbs. respectively.

4. *Sex Ratio* :—No studies appear to have been made with reference to the sex ratio in buffalo calves. A total of 556 calves were studied of which 284 were males and 272 females. The secondary sex ratio worked out to 51.1 per cent.

5. *Interval Between Calvings* :—The average calving interval for Egyptian buffaloes was found to be 501.3 days by Asker and Ragab (1951) while Knisin (1951) reported the same to be 585 days. Ragab, Asker and Ghazy (1954) found the mean calving interval for Egyptian buffaloes to be 541.7 days.

This factor was studied with reference to 163 Murrah buffaloes involving 412 calvings. The interval between calvings worked out on the average to 504 days.

6. *Interval Between Parturition and First Oestrus* :—In Bulgaria, buffaloes calving yearly come on heat early in their lactation period upto 118 days post-partum, while those calving every 1½ to 2 years show post-partum heat at the end of the lactation period (8 to 12 months) (Kaleff, 1932). Hafez (1952) reported that the Egyptian buffalo shows post-partum oestrus 22 days after calving.

This factor was studied for 144 calving involving Murrah buffaloes and the average interval between parturition and appearance of first oestrus worked out to 87.7 days.

7. *Oestrous Cycle* :—The mean length of oestrous cycle for the Bulgarian buffalo was reported to be 21 days (Kaleff, 1932) and for the Egyptian buffalo also the same period was reported (Hafez 1952). The same author found the length of oestrous cycle much more variable in the Egyptian buffalo than in the cow. Ocampo (1939) reported 34 days for the Philippine buffalo, 37 days for the Indian buffalo and 31 days for the Philippine X Indian cross, as the mean length of the oestrous cycle.

The length of oestrous cycle for 74 Murrah buffaloes worked out to 22.9 days on the average.

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STUDY OF ANTHELMINTIC PROPERTY OF GARLIC IN POULTRY

By

B. R. DAS GUPTA and A. MUKHERJI
Department of Pathology and Preventive Veterinary
Medicine, Bengal Veterinary College.

Literature

Garlic is known to be used in the indigenous system of medicine as anthelmintic in man. Kaviraj Gupta (1909) mentioned that garlic acts as a vermifuge and expels round worms. Modern Pharmaceutists have developed purified proprietary preparations of garlic and claim therapeutic value in round worm infestations. T.C.F. Garlicyl is one of such preparations which claims good results against Oxyuriasis in man. Levy (1950) advocated the use of garlic in dogs for vermifuge action, but further details have not been furnished by the same author. Literature with regard to the anthelmintic properties of garlic in animals seem to be very rare.

Materials and Methods

The present authors were prompted by the above indications and arranged small scale experiments in poultry to find out the results.

Accordingly, several fowls, weighing between 2 to 3 lbs., were selected at random from the flock belonging to the Bengal Veterinary College and caged separately for collection of faeces from the individual fowls. The number of eggs per gram (E.P.G.) of faeces from individual fowls was recorded for three consecutive days. The egg counting technique, as recommended by Monnig (1950) was adopted in the present work. Eight fowls of same size and passing larger number of eggs in the faeces were sorted out and the types of eggs determined. These fowls were divided into two batches on the basis of average E.P.G. The experimental and control batches consisted of 6 and 2 fowls respectively. Each batch was then accommodated separately.

TABLE I

Fowl No.	Type of eggs detected in the faeces.	E. P. G. Average of 3 days prior to garlic feeding.	E. P. G.					Remarks.
			Days after garlic juice feeding.					
			1st day.	2nd day.	3rd day.	4th day.	5th day.	
<i>Experimental batch.</i>								
70	Capillaria	{ 3000	1000	Neg.	Neg.	Neg.	Neg.	E. P. G. slowly came down to 200 on 9th day and became negative on 10th day.
	Hetarakis	{ 1000	300	Neg.	Neg.	Neg.	Neg.	
175	Hetarakis	6000	4000	3000	3000	2500	1000	
	Capillaria	{ 4000	4000	2000	1000	1000	300	Negative on 8th day.
105	Ascardia	{ 1000	1500	1000	800	500	200	A few eggs continued to pass out even after 10th day.
	Capillaria	{ 3000	2000	1800	1200	400	Neg.	
56	Hetarakis	{ 1000	1300	800	500	200	100	
110	Capillaria	5000	3000	1000	200	Neg.	Neg.	Negative on 7th day.
90	Capillaria	3000	1000	Neg.	Neg.	Neg.	Neg.	
<i>Control Batch.</i>								
50	{ 4000	Capillaria	4500	4000	4200	4400	4200	E. P. G. remained more or less unaltered upto one month, the maximum period examined.
	{ 1000	Hetarakis	1000	1200	800	1000	1100	
52	{ 5000	Capillaria	4000	4800	5200	5000	5000	
	{ 2000	Ascaridia	2200	1800	2100	2000	2100	

Garlic juice was extracted from garlic bulbs by smashing them in the mortar and adding minimum quantity of water to the smashed bulbs which facilitated better extraction. Each fowl of the experimental batch was fed with 5 c.c. of such juice in pipette daily for 5 (five) consecutive days, while the control batch did not receive garlic juice feeding. Both the batches were managed under indentical conditions during the period of experiment. The results are given in Table I.

TABLE II

Fowl No.	Type of eggs detected in the faeces.	E. P. G. Average of 3 days prior to garlic feeding.	E. P. G.			Remarks.
			Days after garlic whole bulb feeding.			
			1st day.	2nd day.	3rd day.	
		<i>Experimental batch.</i>				
44	Capillaria	5000	5200	2500	100	Neg. on 4th day.
75	Ascaridia	1000	1000	500	300	A few eggs passed even on 10th day.
13	Hetarakis	7000	5000	3000	800	Neg. on 7th day.
58	{ Capillaria	2000	800	200	Neg.	Neg. on 9th day.
	{ Hetarakis	4000	2000	1000	300	
107	Capillaria	6000	4000	1800	200	Neg. on 5th day.
713	Ascaridia	4000	3000	1800	1000	E. P. G. did not come below 200 even on 10th day.
60	Hetarakis	5000	2000	1200	500	Neg. on 7th day.
1	{ Capillaria	4000	2500	1000	100	Neg. on 4th day.
	{ Hetarakis	2000	1200	800	200	Neg. on 8th day.
200	Capillaria	5000	2400	1000		
201	Capillaria	6000	3000	800	400	Neg. on 5th day.
202	Hetarakis	4000	2000	1000	500	A few eggs passed even on 10th day.
203	{ Hetarakis	3000	1200	600	400	Do. Do.
	{ Ascaridia	2000	1600	1000	800	E. P. G. did not come below 300 even on the 10th day.
		<i>Control batch.</i>				
204	{ Capillaria	5000	4800	5000	5400	E. P. G. remained more or less unaltered upto one month, the minimum period examined.
	{ Hetarakis	1000	1000	1200	1000	
205	Capillaria	4000	3500	4200	4200	
206	Hetarakis	3000	3200	3000	2800	
207	{ Capillaria	3000	3300	3200	3000	
	{ Ascaridia	2500	2700	2500	2400	

The authors were encouraged by the results of the first experiment and arranged a second experiment with a fresh lot of 16 fowls showing high egg count. Out of these, 12 fowls were brought under experiment and 4 fowls were kept as controls. In this experiment, instead of garlic juice, garlic bulbs were fed to the fowls of the experimental batch, each fowl received one whole bulb per day for 3 consecutive days, while the control batch remained without garlic feeding. Both the batches were accommodated separately and were managed under identical conditions, as in the first experiment. It was found that the fowls ate garlic bulb willingly when their stomach was empty, i.e., before eating their morning ration, but showed reluctance towards garlic when their stomach was full. The results of this experiment are given in table II.

Discussion

Garlic whole bulb was found to be equally efficacious as garlic juice against round worms of poultry. The feeding with whole bulb was found to be easier and safer than pipette feeding. Out of the three main types of round worm eggs detected in the faeces, the *Capillaria* seemed to be most susceptible to garlic, next the *Heterakis* and the least susceptible were *Ascaridia*. No tape worm eggs or oocysts of coccidia were detected in the faeces of any fowl examined; hence, the action of garlic against them could not be studied. It was observed that garlic acted more as a Vermifuge than a Vermicide, as plenty of living larvae and some adult worms were passed out in faeces 24 to 48 hours after garlic administration. It was, further, noticed that a laxative dose of olive oil administered at the end of the garlic feeding helped the Vermifuge action of garlic. It seems possible to employ this indigenous cheap herb as a prophylactic against round worm infestations in poultry if fed every month as a routine practice. Besides, garlic is a powerful intestinal antiseptic and possesses a distinct food value as it is rich in Vitamins A, B₁, C and G and minerals such as calcium, phosphorus and iron.

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Clinical Articles

AN OUTBREAK OF INFECTIOUS KERATOCONJUNCTIVITIS OF BOVINES IN PARBHANI DISTRICT (HYDERABAD STATE)

By

ZAHIR AHMED, B.V.Sc.,

Asstt : Veterinary Surgeon,
Veterinary Hospital, Parbhani,

and

K. RAMA RAO, D.V.O., Parbhani.

Introduction :—In the first week of February 1955 four cases of conjunctivitis in bovines were admitted as out patients in the Veterinary Hospital, Parbhani and were treated in a routine way. In the second week of the same month the number of cases increased to 12 which led me to suspect it as of infectious nature. The material from these cases was submitted to Veterinary Investigation Officer Hyderabad, for examination who tentatively diagnosed it as due to *Moraxella bovis*. This was later confirmed by I.V.R.I. Although there is a record of similar disease in India by Mitter (1915) there is no mention of the casual organism. To the authors knowledge this is the first record of the occurrence of this disease in India, wherein the etiological agent could be established as *M. bovis*.

Review of Literature :—This disease has been recorded in various parts of the world; in India, Mitter (1915) (details are not available), South Africa, Coles (1936); Holand, Poels (1911); and Canada, Allen (1919) (as cited by Formston in 1954).

The first mention of *Moraxella (Haemophilus) bovis* as possible aetiological agent was made by Watt (1951) who encountered Keratitis in dairy cattle in Scotland. He isolated *H. bovis* but did not succeed in transmitting the disease (cited by Formston 1954).

Formston England (1952-53) attended five outbreaks of Infectious Kerato-conjunctivitis. Organism was morphologically similar to *H. bovis* in smears but attempts to culture them failed.

Present outbreak :—The disease was observed by the authors in 14 herds of cattle at Parbhani proper and surrounding villages where 19 to 51% of cattle in each herd were affected.

The disease once entered in a herd rapidly spread among other animals within a week or two. This year the outbreak seemed to be seasonal. (February 1955 to First week of June 1955).

Symptoms :—The clinical manifestation of Infectious Keratoconjunctivitis could be studied in 127 of 188 cases admitted to the Veterinary Hospital, Parbhani during the course of outbreak.

The disease was encountered in three different forms as mentioned below :—

1. *Mild Form* :—Very slight to moderate lachrymation was present, as the lachrymation increased a typical line on the face below the inner canthus of the eye exposing the wet and soiled hair appeared. Most of the cases were naturally cured even without treatment within one or two weeks. Palpebral and bulbar conjunctivae slightly congested; one or both eyes were affected. In some cases slight smoky turbidity of cornea was observed.

2. *Acute Form* :—Some of the mild cases developed into an acute form whereas in others, the condition was acute from the very beginning. The symptoms commenced with severe conjunctivitis, profuse lachrymation—discharge being watery in the beginning and purulent later followed by Photophobia, blepharospasm, matting of eye lashes, Hypertrophy of Palpebral conjunctiva, and drooping of the upper lid and Keratitis with diffuse corneal opacity were observed.

3. *Chronic Form* :—The lachrymal discharge was more mucoid. There was hypertrophy of conjunctiva, about 36% of cases were showing "Trachoma", granular conjunctivitis. When the upper and lower eye lids were exposed for collection of conjunctival scrapings or smears, a granulated surface was very prominent on the congested conjunctiva (Fig. 1).

Due to lachrymal and mucoid discharges, the skin below the eyes was matted and soiled resulting in dermatitis and at times sloughing (Fig. 2). Keratitis with ulcer of cornea either central or marginal was present. The corneal ulcer began as small raised white area which broke down leaving the ulcer. In some very severe cases the entire cornea was involved, exposing a cone-shaped bulging when viewed from the side. Often there was a concave ulcer at the apex. In some cases the whole cornea was vascularised. Excepting in the more severe cases (where the whole cornea was severely involved) the circum corneal vessels gradually worked their way towards the ulcer and the healing took place in one or two months. The scar also disappeared later. In general the course is from two to five weeks with high percentage of recovery.

Mortality is practically nil but animals are rendered incapable for work for pretty long time ranging from 2 weeks to 2 months (depending upon the treatment sought for).

An Outbreak of Infectious Keratoconjunctivitis of Bovines in Parbhani District (Hyderabad State)

By

Zahir Ahmed and K. Rama Rao



Fig. 1



Fig. 2

Twinning in a she-buffalo

By

Mohammed Hamid Afsar, B.V.Sc.



Fig. 1.



Fig. 2.

AN OUTBREAK OF INFECTIOUS KERATOCONJUNCTIVITIS

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The summary of clinical observations of the 127 cases that could be followed up of cattle (of which 114 are adult and 13 calves under 1½ year) are given in the table below:

Sl. No.	Kind of animal	Total No.	Unilateral		Bilateral		Granulation		Keratitis		Ulcers of cornea	
			No.	%	No.	%	No.	%	No.	%	No.	%
1.	Adult cattle	114	73	64.03	41	35.96	42	36.84	26	22.81	10	8.77
2.	Calves	13	8	61.54	6	46.15	9	69.23	4	30.76	2	15.38
3.	Buffaloes	27	18	66.66	9	33.33	—	—	6	22.22	—	—

It is evident from the table that the infection was more severe in young calves.

Affection in Buffaloes:—During the same period of the outbreak i.e. Feb. 1955 to June 1955 (27) buffaloes with conjunctivitis (18 unilateral and 9 bilateral) were encountered. From two of these cases conjunctival scrapings submitted for microscopic examination failed to reveal any organism resembling *M. Bovis*.

However the authors feel that it is premature to arrive at any conclusion regarding the etiology of this condition in buffaloes.

Treatment:—Treatment was purely symptomatic. Many of the common drugs such as Yellow ointment, Z.A.B. drops, Argyrol, Propamidine Ophthalmic solution M & B, Sulphanilamide ointment, Mercurochrome Silver Nitrate solution, Udolac I.C.I. and Aureomycin ophthalmic ointment have been tried. The authors feel that though early treatment cuts short the course of the disease and avoids complications in each one of the drugs tried, yet a specific line of treatment has yet to be evolved.

Discussion:—The authors clinical findings are in agreement with the clinical syndrome described by Uddal, Jackson and Formston etc. in U.S.A. and U.K. except the granular conjunctivitis.

At the time of writing the article the authors could not procure the article of Mitter 1915 India, as such they are not sure whether he had recorded granular and ulcerative conjunctivitis in an outbreak form.

Similar cases in the buffaloes failed to reveal any *M. bovis*.

Summary

The clinical features of kerato conjunctivitis in a total of 134 cases including cattle and buffaloes are presented.

The disease was highly infectious.

3. The disease appears to be due to *M. bovis* reported for the first time in India.

4. Treatment has successfully been carried out on symptomatic lines using many patent medicines.

Acknowledgment

The authors are thankful to Dr. K. Raghavachari and his staff for examining the materials. Suggestions given by Dr. Kulkarni, Civil Surgeon, Parbhani, are gratefully acknowledged as well as the very helpful guidance given by Dr. K. S. Shetty, G.M.V.C., Ph.D. (Edin.), Director, Veterinary Department, Hyderabad-Dn.

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TWINNING IN A SHE-BUFFALOE

By

MOHAMMED HAMID AFSAR, B.V.Sc., (Osmania),
Veterinary Asst. Surgeon, Nagaram, Andhra.

Twinning in she-buffaloes is indeed rare. Here is a case.

On 9-3-1956 at 5 P.M. when a trio of veterinarians including myself were closing up the day's hard work in a district cattle show at Tatepaka village, East Godavari District, we received a call for attending on a case of twin dystokia in a she-buffaloe. The rarity of such cases made us rush to the spot. The she-buffaloe was found straining hard, after delivering one of the co-twins. The vulval lips of the she-buffaloe were partially open and one of the fore limbs of the foetus could be seen through. The animal which was of the local breed was completely exhausted and her respirations had become extremely hurried since the first delivery which had taken place four hours ago.

With no obstetrical instruments with us, two of my colleagues Dr. N. Srinivasa Rao, G.M.V.C., B.V.Sc., and Dr. M. Brahmananda Rao, B.V.Sc., started handling the case taking all antiseptic precautions while I refrained from joining them for the fear of "spoiling the broth". Their strenuous efforts of half an hour could not bring relief to the animal. I was then invited to take my chance.

On putting my hand inside the genital tract I came to know that the foetus was in an anterior presentation and dorso-ventral position with the right lateral deviation of the head. I then inserted the other

THE INDIAN VETERINARY RESEARCH INSTITUTE, IZATNAGAR.

Special Course in Artificial Insemination & Physio-Pathology of Reproduction
For Key Village Officers, 1956, organised by Dr. E. PALSSON, F.A.O. Expert.



Sitting:—L. to R.

Standing:—

Dr. D. P. Mukerji (B. C. Training), Shree S. N. Lukute (R. O. Steility), Dr. E. Palsson (F. A. O. Expert),
Shree L. Sahai (Director), Dr. P. Bhattacharya (Head of D. A. G.), Shree Gajjan Singh (A. R. O. A. I.),
Shree Chet Ram. (A. R. O. I. G.), D. D. Ahluwalia (H. P.), Capt. Rattan Singh Dyal, D.D.A.H. (Punjab),
Raviraj Singh (U. P.), Rattan Singh (Pepsu), K. K. Paul, (R. A. I. V. R. I.), Dharam Pal (Punjab),
N. P. Kaushik (Delhi), V. U. N. Dikshitula (V. P.), G. S. Rawat (U. P.).



P. K. RAMACHANDRAN,
B.Sc., B.V.Sc., M.R.C.V.S.,
who has returned to India recently after completing
his studies in United Kingdom.



T. ANANTHAPADMANABHAN, G.M.V.C.,
who has been appointed as
Deputy Director of Animal Husbandry, Madras.

hand also and pushed the foetus which was in the left cornu of the uterus about six inches inside and corrected its position. This helped the ejection process and the foetus came out with very little difficulty. The foetus so delivered was found to be weaker than its co-twin and was actually gasping for breath. It was therefore necessary to resort to artificial respiration. After five minutes the calf came to normality and could stand.

The co-twins which are quite healthy to this day are male calves, the one delivered later was naturally weaker having been formed in the left cornu of the uterus.

News and Views

The King of Saudi Arabia has donated a sum of Rs. 10 lakhs for the proposed Medical College of the Aligarh University. The money is being sent to the Prime Minister.

* * *
Hyperion to retire from the Stud.—Newmarket, May 28. Hyperion, Britain's champion sire of winning race horses, retires from the stud next month to end a fantastic chapter in the history of the English Turf.

Now 26, Hyperion will spend his last days here browsing on the stud farm of Lord Derby, racehorse owner and sportsman.

Racing books bulge with statistics about him. Six times he was Britain's champion sire when his offspring were leading prize money winners. In England and Ireland alone he sired the winners of about 660 races. They won around £250,000 for their owners.

In every country that has a race track the impact of Hyperion can be seen. He sired three of America's present-day leading stallions—Khaled, Alibhai and Heliopolis—and also the dam of Citation, the most famous of all American racers. In Britain his progeny include a Derby winner, two St. Leger winners and four winners of the Oaks, the fillies' classic.

* * *
Indigenous Medicine.—The formation of a Board to control practitioners in the indigenous systems of medicine has been suggested by the committee appointed by the Central Council of Health to study the question of formulating uniform standards in respect of education and regulation of practice of 'vaid's', 'hakims' and homeopaths.

Another suggestion of the committee is that there should be separate registers for practitioners in the Ayurvedic, Unani and Homeopathic systems.

Sri T. Ananthapadmanabha Pillai, G.M.V.C., is the latest addition to the cadre of Deputy Directors in Madras. We are happy to note that young men of proved ability are receiving recognition at the hands of the Government in Madras state. We wish the young band of Animal Husbandry workers, best of luck!

The new Director of Animal Husbandry, Madras, has started well in getting some of the 'heavy' districts bifurcated and trifurcated for purposes of efficient work at District level. The District Veterinary Officers hold the key position in administration and it is but proper that steps should be taken to render all facilities to them and then expect them to rise to the required standard and make the Animal Husbandry work, the success it ought to be, under the Second Five Year Plan. We wish them all success!

Under the caption "Boosting Agricultural Production", the *Hindu* has written a very thought provoking editorial in its issue of 9th June 1956. It says "the proposal to raise the target for increase in agricultural production to 40 per cent. is based not on a realistic appraisal of possibilities" but on a desire "to fill the gap between needs and resources in order to make the plan (Second Five Year Plan) plausible".

The plan the paper says is vitiated by wishful thinking. Writing on co-operative farming so much made of in these days, the paper says, "the existence of desire and aptitude for co-operative endeavour on the part of the rural folk and the availability in sufficient strength of the right kind of leadership" are pre-requisites.

As regards the use of Chemical Fertilisers the paper says "it may lead to an initial spectacular increase of production, which can, however hardly be kept up; and unless continuous attempts are made to replenish the vitality of the top layer of productive soil the country may have to pay dearly in the years to come in extensive soil erosion". And this nationalist paper makes an impassioned plea when it says "the Government should also frankly recognise the wastefulness, not to say unwisdom, involved in destroying the traditional props of the agricultural economy and then casting about desparately for novel substitutes in order to stimulate production". We hope the Animal Husbandry planning is on a much better footing. To this we will return in our next editorial.

Block Development Corner

[Articles under this section, should be more in the nature of simple 'talks' to rural folks and village level workers, on Animal Husbandry matters, and not loaded with scientific terms and theories.]

GOAT-REARING

By

T. VINAYAKA MUDALIAR,

Retired Livestock Development Officer, Government of Madras.

India has declared war on her economic front. She has launched an all-out attack to eradicate poverty, want, dirt and disease. The eyes of the world are on her to day. They watch with sympathetic concern whether she would go down fighting or come out victorious. The success or otherwise of this great campaign is centered round the several Block Development Centres. So realise in time the great part which the B. D. C's are called upon to play in this historic struggle. Every item of livestock industry should therefore receive your attention to increase the economic prosperity of the land. So I propose drawing your attention to Goat-rearing in this article.

Don't be frightened at the mere mention of the word 'Goat'. For you have heard people saying that it is a devastating animal not worthy to be considered in any scheme of human enterprise. But it is well to remember that there is more than one opinion about most things in this world. It all depends on how the goats are *kept* and *reared*. I sometimes wonder who is more devastating to day—man or goat? Look at our denuded forests and terrains and even the beautiful avenue trees! The goat at least nibbles at the leaves but man fells the trees and lays bare beautiful forests, parks and roads, without any planning even, for rehabilitation. No doubt, man does this under the stress of economic distress and in the name of grow more food campaign. The same right to live, when exercised by a goat, gets him the bad name which he patiently bears. I realise two wrongs cannot make one right. I don't justify the goatish havoc from the havoc caused by man in recent years, leading to soil erosion and leaching of good old mother earth. Both require to be properly directed.

Well, whether we like goats or not, they have a definite place in the rural economy of our land. Otherwise we cannot account for over 40 millions of goats in India to day. I am not stressing much on the raising of goats as a general industry. That industry

will take care of itself. It is one of the oldest of industries in this country and is fairly well-established. But my plea is for what little a village can get in way of milk from these goats, to improve the plane of nutrition of her growing children and incidentally contribute its mite to the economic prosperity of the land. So let us see how and why B.D.C's should encourage rearing of *dairy-goats* as part of mixed-farming.

Goat has rightly been called the poor man's cow. Comparatively speaking, it is cheap to buy goats and cheaper still to maintain. Goats soon learn to eat and thrive on all house-hold food and vegetable remnants. They thrive on all sorts of leaves and hedge trimmings. Banyan, Margosa, Babool, etc., serve as fodder trees. A little grass out of what you get for your cows, bullocks and horses, but kept clean and un-soiled, should also serve the purpose. Thus it would be realised what a cheap animal it is to maintain in a poor country like ours. Four to five goats could be maintained for the same cost as one good cow and the total yield of milk may perhaps be even greater.

Goat as a dairy animal is not fully exploited in the villages. Milk as an article of diet is unsurpassed. The poor cannot afford either to keep cows or to purchase cow's milk. The goat's milk is equally nutritious and in some respects even superior to cow's milk. Its fat particles (globules) are much smaller than those in cow's milk and this makes it more easy to digest. This coupled with the fact that it is alkaline in reaction unlike the cow's milk which is slightly acid in reaction, makes it an ideal food for children, invalids, aged people and people with weak digestion. It is superior in mineral content also and is thus good particularly for growing children. One objection that is often raised is that the milk of goats has a goaty flavour. This is again the result of un-hygienic methods of rearing goats and producing milk. The Buck (male goat) should be kept away from the milking does as he generally smells strongly, which is conveyed to the milk, and has the habit of urinating often all round and even on does nearby. Keep the place clean, groom the goats daily, wash the udder before milking and dry it. Wash the goats once a week in hot weather. It is not safe to wash them if the weather is chill. The milk after being drawn should be strained through a thin muslin cloth to remove hair and other particles of dirt. These precautions will ward off the goaty flavour.

A she-goat should be mated when she is about 18 months old. Her gestation period is about 5 months. She gives one, two and some times three kids. A he-goat is fit for "service" only when he is about 15 months old. The age limits indicated here are the best suited for breeding purposes, though the goats may appear fit for breeding much

earlier. A she-goat can be mated about 2½ to 3 months after kidding. The kids need mother's milk for the first fortnight. After that they can be given a few leaves and a little grass and the milk-feed can be reduced gradually. When they are 2 or 3 months old they can be trained on a little concentrate feed also. The average length of life of a milking goat in England is said to be 10 to 12 years.

As in the case of cows, a good milking goat should be given a little concentrate feed also. It may be in the form of a grain mixture such as Bengal-gram, Cotton seed, Black-gram, Ragi with a little ground-nut cake. They must be given well soaked in water for nearly 24 hours in advance or even well ground and liberally moistened. Otherwise two or three handfulls of the feed prepared for cows at home should suffice for a goat in addition to the fodder supplied and house-hold food remnants, such as tops of vegetables, stale cakes, etc. It may be roughly put down that the maintenance ration for a milk-yielding doe is about a pound of concentrates given in two feeds and about additional 4 ounces for every pound of milk produced, as production ration. What is the return? On an average you may be able to get 3 to 4 lbs of milk a day from a good strain of doe. There are goats yielding up to 8 and 9 pounds of milk a day. Fancy what a difference it would make in the feeding of your children or in the augmentation of your little income! You can gradually develop this as a cottage industry and thus benefit yourself and benefit the country. The woman folk and the children in the house will manage well this side-show. What is the margin of profit, you may ask? Here are a few recorded evidence depending of course on the quality of goats kept. "The net profit amounts to Rs. 20/- per month on a flock of 10 goats in milk". "This left a net profit on the young doe of Rs. 7-1-1 for the month". "This left a net profit of Rs. 25-12-0 on the two goats for the month".

Raising of herd of dairy goats at village level, offers an interesting prospect, which should not be ignored. The principles I have indicated in my first article on raising of Dairy Cows (*I.V.J.* January 1956) apply with equal force for raising of Dairy Goats, with regard to scientific breeding, proper feeding and management, and improving marketing facilities. It is an art and a science which can only be learnt by experience.

Again where are such goats to be got from? Search for them in your own area and round about. Pick up *above average* does in milk yield and you can slowly build upon them through improved feeding and management, selective breeding and grading-up work.

Next you can get them from some of the Government livestock farms like Hissar, Malabar &c or from farms run by Missionary

agencies like those at Etah, Katpadi and Allahabad or from breeding tracts of some of the well-known breeds of goats, such as Jamna Pari, Beetal, Surti, Bari-Bari, Cutch and Malabar. Some of the foreign breeds like Saanan, Toggenburg, Alpine and Nubian may be thought of where funds are available. At Governmental level, more and more goat farms may be opened and run as seed depots for distribution of stud-rams. A stud-goat scheme like the Premium scheme in cattle, may be initiated by the Government. Cross-breeding experiments are long overdue and Government should be forced to establish such stations under the Second Five Year Plan. The Block Development Centres should show such live interest in Animal Husbandry matters and keep on, like Oliver Twist asking for more. Otherwise you will be treading only the beaten track without much expansion and progress.

Your Veterinary Officer should be able to give you more detailed information on this aspect of rural economy.

CATTLE BREEDING UNDER KEY VILLAGE SCHEME, CERTAIN INTERESTING OBSERVATIONS

BY

DHARAM PAL,

*Veterinary Assistant Surgeon, in-charge Key Village Scheme,
Chandigarh (Punjab)*

Introduction

India has one-fourth of world's cattle wealth. Our cow is, however, the poorest yielder on the globe. In her present state, she is a burden on the land and competes with man, for her existence. Her future and consequently that of Indian agriculture, continues to remain bleak unless she turns out to be more economical and thus help the nation to raise its standard of life.

This deterioration has come about through unscientific and unplanned breeding going on, in the country side. The lay breeder accepts any bull for his cow, quite unconcerned with his milk index and other hereditary characteristics.

With the establishment of Key Village Scheme, a first major step has been taken to re-organise the cattle wealth of the country on sound scientific lines. Artificial Insemination (A. I.) has been introduced under the scheme for the first time on a country wide scale. This technique once it overcomes the bias of our illiterate masses and captures their imagination, would obviate the hotch-potch

breeding so far going on. The breeding would then fall in the hands of Animal Husbandry experts who know what they are after and would proceed systematically towards the target.

The author is working under Key Village Scheme in Punjab State, since its inception in 1954. In this review he records certain practical observations, on incidence of breeding season and comparative study on Artificial Insemination technique, as applied to cows and buffaloes. The A. I. in cows has long been tried in Russia and other countries on the continent, with very good results. On buffaloes, however, the technique has been introduced for the first time in India on such an extensive scale. It would be therefore not without interest to collect certain particulars of observation, as formulated in this paper.

Materials and Methods

Sufficient facilities are provided under the scheme to record reliable findings. A Stockman is placed in charge of each Key Village. The bulls meant for natural services are stall fed and services natural or otherwise are strictly controlled. A. I. is done both by Veterinary Assistant Surgeon himself while on a visit to these villages and also by his Stockmen who are adequately trained for the task. The Key Villages are spread within five to six miles of radius, from the Centre and semen is transported by the messenger on cycle. Ice is also regularly supplied in a similar way.

Collections are based on semen requirements, and are taken by the Veterinary Assistant Surgeon at the Centre. The Artificial vagina (A. V) is of FAO pattern and due to considerable use, it had lost some of its original firmness.

Mean maximum and minimum monthly temperatures were obtained from the Director, Metereological Centre, New Delhi. Particulars in respect of humidity factor were also supplied by the same Institution.

Results and Discussion

I. (a) Incidence of Oestrus :—

The incidence of Oestrus under Key Village Scheme, Chandigarh has been tabulated in table I. The total number of adult females over 3 years and fit for breeding at this Key Village Centre are 775 cows and 1758 buffaloes respectively and it is evident that from the period November, 1954 to October, 1955, 433 cows (55.8%) and 867 buffaloes (49.3%) were served.

TABLE I
Incidence of Oestrus monthwise (1954-55).

Month.		No. cows served.	% cows served.	No. of buffaloes served.	% of buffs served.	No. adult females over three years and fit for breeding.	
						Cows.	Bufs.
Nov.	54	13	3%	136	15.68%	775	1758
Dec.	54	22	5.08	82	9.45		
Jan.	55	20	4.61	65	7.49		
Feb.	"	54	12.47	42	4.84		
March	"	79	18.24	12	1.37		
April	"	63	14.55	2	0.23		
May	"	40	9.26	3	0.35		
June	"	34	7.85	23	2.65		
July	"	22	5.08	26	3		
August	"	26	6.23	97	11.18		
Sep.	"	37	8.54	178	20.53		
Oct.	"	23	5.31	201	23.18		
Total served.		433		867			
% served.			55.8%		49.3%		

In cows, Oestrus was more pronounced from February to April with the peak in the month of March when the mean maximum temperature was 85.9° F and minimum temperature was 62.5° F (Table II). In May and June it remained moderate but with the on-set of rainy season there was a fall in the breeding rate. Oestrus in cows, however, continued throughout the year though it remained somewhat suppressed in winter months. It is obvious that optimum range of temperature for higher incidence of oestrus in cows lies between 60° and 85° F.

TABLE II
Maximum, minimum temperature, rainfall and humidity data in respect of Chandigarh 1954-55.

Months.	Monthly mean temps.		Monthly rainfall inches.	Monthly mean relative humidity.	
	Max.	Min.		At 0830 Hrs.	At 1730 Hrs.
Novr. 54	79.8	50.6	—	50	35
Dec. 54	71.5	43.2	—	56	40
Jan. 55	66.1	43.1	3.34	78	68
Feb. 55	73.9	45.9	0.21	63	43
Mar. 55	85.9	62.5	1.01	51	38
Apr. 55	90.6	62.2	0.92	36	20
May 55	96.4	67.1	1.12	36	25
June 55	102.9	78.5	4.38	17	27
July 55	93.0	71.1	17.42	76	53
Aug. 55	88.7	71.7	11.99	89	70
Sep. 55	88.8	67.5	12.38	76	70
Oct. 55	84.0	59.5	9.13	60	72

In buffaloes, frequency of Oestrus was noticed highest in September, October and November with the peak reaching in the month of October when the mean minimum and maximum temperatures were 59.5 and 84° F. It was at the lowest ebb in the months of April and May though it remained somewhat moderate in other months of the period under review. There is as such, no definite breeding season amongst buffaloes (*viz* cessation of oestrous cycle) as spoken of in lay circles in this country. It is apparent, therefore, that it is quite possible to ensure uniform breeding throughout the year provided better animal management and feeding practices are attended to seriously. It is apparent from the table II that the favourable temperature range for optimum breeding in buffaloes lies between 60-85° F while temperature above 90° tends to retard it. The period covering largest number of services in this species, appears to follow after the rainy season.

The range of temperature for optimum breeding in both cows and buffaloes is thus observed to be identical *viz* 60 to 85° though cows breed their maximum in spring and buffaloes in autumn.

However the range of relative humidity in March (peak-breeding cows) was between 55 & 51 and in October (peak-breeding buffaloes), it was between 60 & 70. The requirements of more relative humidity in buffalo stock is noteworthy, (Table II).

It may be mentioned here that incidence of oestrus in cows and buffaloes monthwise, may vary in this country from place to place and also at the same place according to the variation in climate and rainfall etc. The data collected in this paper only relate to Chandigarh in 1954-55.

(b) Relation to Ovulation.

The oestrus in cow lasts for 12 hours on an average and ovulation takes place in 20-40 hours after on-set of oestrus (Lambert and Makennic 1940 as quoted by S. Kumaran). In buffaloes, the duration of oestrus varies and may last 2-3 days. Ovulation in buffaloes is generally accepted to occur within 18 to 24 hours of on-set of heat (Luktuke S. N., I.V.R.I.). The exact time for inseminating a buffalo is somewhat therefore difficult to reckon at and probably this is one of the reasons of comparative low conception in this stock through A.I. technique. The insemination may therefore be repeated after every 5-7 hours if the animal remains in heat.

II. Comparative Study on A.I. Technique.

As already said, A.I. has been tried successfully in cows since long time back in different countries but the technique is just making

a beginning in respect of buffaloes for the first time on such a large scale. It appears that the problem in buffalo is not as simple as in cows to achieve that degree of success. There are certain obstacles in this particular species which tend to limit the utility of A.I. on the practical field, at the moment. This aspect shall have to be explored and difficulties overcome to make a good start in buffaloes. The salient features where variations and obstacles in buffaloes are encountered have been enumerated as under:—

(i) *Collection of semen.*

(a) The penis of the cow bull is more voluminous and hence requires less water pressure in the A.V. in comparison to the buffalo bull. The quantity of water required in A.V. actually depends upon the size of A.V., the size and thickness of penis and also on the force of thrust exhibited by the particular class of bull. It is also influenced by the period since A.V. is in use and consequent firmness it retains.

The A.V. used at Chandigarh Centre is of 16" x 2½" size and has been in use since early 1954. As at present it has been observed that cow bull reacts better, when approximately 500 to 600 c.c. of water is put into it while the buffalo bull requires approximately 100 c.c. more.

The Haryana and Hissar cow bulls give vigorous thrust into the A.V. and hence the latex lining, cone and collecting tube should be fastened firmly. The water pressure should be adjusted otherwise the lining is likely to burst or the collecting tube blown off. The push given by the buffalo bull is however not so vigorous.

(b) The temperature of water required to be put into A.V. depends upon the reaction time and the atmospheric temperature. In winter the temperature of water required is somewhat higher than in summer. This margin of higher temperature is necessitated to compensate for the loss of heat, likely to be dissipated under the chilly climate in winter. By the time the bull is ready to mount, the temperature in A.V. should correspond to that of the vagina of female. This will help to get a better ejaculate.

It has been observed that water is required to be put into A.V. in summer at 50–55°C and in winter at about 60–62°C. Practically a buffalo bull also responds to this range of temperature.

(ii) *Volume of Ejaculate.*

It has been observed that the cow bull on an average gives 4.4 c.c. of semen while buffalo bull yields an average of 1.7 c.c. (Tables III & IV).

TABLE III
Volume of Ejaculate Cow Bull.

Bull No.	Age and breed.	Month	No. collections during month.	Average volume per collection.	Remarks.
H 45 20	Hissar Aged 6 Yrs.	Jan. 55	2	3.5 cc.	
		Feb. 55	4	4.75	
		Mar. 55	5	4.4	
		Apr. 55	6	4.33	
		May 55	3	5.0	
		June 55	4	3.75	
		July 55	1	4.0	
		August 55	—	—	
		Sept. 55	1	5.0 cc.	
		Oct. 55	3	5.0 cc.	
		Nov. 55	5	5.12 cc.	
		Dec. 55	—	—	
Overall average per ejaculate			4.44 cc.		

TABLE IV
Volume of Ejaculate Buff Bulls.

Bull No.	Age and breeds	Month,	No. collections during month.	Average volume per collection	Remarks
5	Murrah Aged 9 Yrs.	June 55	3	2.33 cc	Total No. collections 45.
		July 55	2	2.0	
		Aug. 55	4	2.0	
		Sep. 55	3	2.33	
		Oct. 55	7	1.92	
		Nov. 55	17	1.47	
		Dec. 55	9	1.32	
4	Murrah Aged 9 Yrs.	Aug. 55	5	1.9	Overall average 1.67 cc.
		Sep. 55	11	1.72	
		Oct. 55	17	1.58	Total No. collections 39.
		Nov. 55	6	1.50	
		Grand overall average			

The collections were taken on requirement basis for A.I. and as such uniform interval between collections was not observed. The cow bull was giving collections on a buffalo bull while buffalo bull No. 4 was giving collection on a she buffalo, not in heat. The buffalo bull No. 5 worked, however, on a female in heat. No collections were taken from bulls during lean months when incidence of Oestrus in respective

species was too low. These instances of stray oestrus females could not be effectively traced out for A.I. and requirements were met through natural service. From table Nos. III and IV, it is apparent that there is no month to month significant variation in the volume of semen in the two species. However, whatever little variation is noticeable is obviously due to large number of collections taken from the same animal during the month. Too frequent collections with less intervals in between them have resulted in smaller average per ejaculate.

(iii) *Viability of sperms in preserved samples.*

It has been observed that buffalo bull sperms in preserved samples (egg yolk phosphate) die out much earlier than those of cow bull, treated under identical conditions. It may be that ideal diluter for buffalo semen is yet to be evolved and this may be another reason of comparatively low fertility in buffaloes under A.I. technique.

Summary

1. Incidence of oestrus in cows and buffaloes has been discussed. Cows accept maximum services from February to April and buffaloes from September to November with the peak record in March and October respectively.

2. The favourable range of temperature for optimum breeding in cows and buffaloes is almost the same viz. 60 to 85° F though the cows breed their maximum in spring and buffaloes in autumn respectively.

3. However, the optimum relative humidity for cows lies between 38-51 and for buffaloes between 60 to 70.

4. There is small volume of ejaculate from buffalo bull which means more frequent collection and less number of inseminations per ejaculate. This apparently point to comparative limited utility of A.I. in buffalo stock. The buffalo bull yields only 1.7 c.c. of semen against an average of 4.4 c.c. of semen given by the cow bull.

5. Low conception amongst buffaloes has been discussed. Poor longevity of buffalo sperms in preserved samples and variable nature of oestrus in buffaloes may be the reasons for comparative poor fertility in this stock.

Acknowledgment

The author is grateful to Dr. Ernst Palsson, F.A.O., Expert in India and Shri S. N. Luktuke (R. O. Sterility I.V.R.I.) for giving valuable advice in preparation of this paper. He is equally thankful to S. P. S. Sahi, Deputy Director Animal Husbandry, Ambala Division and to Capt. Rattan Singh Dyal, Deputy Director, Key Villages, Punjab, for their useful advice and affording necessary facilities without

which this undertaking would have been well nigh impossible. Capt. Rattan Singh Dyal in fact has contributed considerable material to this paper which he obtained on discussion with other A. I. Centres in Punjab and thus made valuable data available to the author.

Shri Angris K. D. has been of considerable help in compiling this paper and he has been particularly useful in making corrections in the original proof.

College News

THE MADRAS VETERINARY COLLEGE

The following candidates have passed the Final Post-Graduate Diploma Examination in Veterinary Parasitology held at the Madras Veterinary College in May 1956.

1. Mukti Brata Chakravorthy, (West Bengal.)
2. Balasubramanian, G. (Madras.)
3. Kamal Raj Lodha, (Rajasthan.)
4. Deodhar, N. S. (Hyderabad.)
5. Hareshwari Prasad (Bihar.)
6. Subramanyan, T. (Madras.)

Madras,
21st May, 1956.

BERTIE A. D' SOUZA,
Principal.

Correspondence

[The views and opinions expressed in correspondence are those of the writers themselves and are not always endorsed by the Editor. Ed. I.V.J.]

The Editor,

The Indian Veterinary Journal, Madras.

Cardiac Hydatidiasis in the Bovine

Sir,

Regarding "Cardiac Hydatidiasis in the Bovine" by Veterinary Assistant Surgeon, Sambamurthi, G.M.V.C., B.V.Sc., in page 347 of March 1956 issue of the *Indian Veterinary Journal* (Vol. XXXII, No. 5), may I draw his attention to the note "Echinococcosis of the Heart in a Bullock" by me from the Bengal Veterinary College, Calcutta, in the *Veterinary Record* of London, November 25th, 1922,

Mr. Sambamurthi has cited references from foreign journals and literature on the subject. I have taken the liberty to state, that, hydatid cyst in muscle tissue, is though very uncommon—it is not that its fin particularly in that of the heart (Cardiac Hydatidiasis) has remained unreported from India. The specimen is kept preserved in the Pathological Museum of the Bengal Veterinary College at Calcutta. A perusal of the article in the "*Veterinary Record*" is expected to elucidate further information as to its prevalence or otherwise in this country.

"Rojoni-Kuteer"
196A, Lansdowne Road,
Calcutta-29.
9th May, 1956.

H. C. GANGULEE.

The Editor,

Indian Veterinary Journal, Madras.

Ref:—The letter of Mr. H. C. Gangulee you have forwarded to me for my remarks.

Sir,

The spirit of my article is to draw the attention of the Veterinary profession to the condition of cardiac hydatidiasis and how fatal it can be and also the extreme rarity of reports on this condition and its pathology. It is not my intention to claim priority of report over Mr. Gangulee's note on "Echinococcosis of the heart in a Bullock".

Government Dairy Farm,
Visakhapatnam.

B. SAMBAMURTHY, B.V.Sc.,
Lecturer, Veterinary Training Centre.

Michigan State University

News Release dated 22nd March '56.

The lessons learned from veterinary medicine research can assist materially in the solution of many problems related to the diseases of man, a Michigan State University professor said here today.

Speaking before the annual meeting of the American Academy of General Practice, Dr. Henrik J. Stafseth, professor and head of the department of microbiology and public health at M.S.U., told the assembled doctors that the work of the 19,000 veterinarians in the nation has made valuable contributions to medical science.

"Since more than 80 diseases of animals are communicable to man," Dr. Stafseth said, "it is obvious that the function of veteri-

narians is not only of economic importance, but of great value to the promotion of public health."

An example of the veterinary research which has made valuable contributions to medical science, Dr. Stafseth said is the discovery of the cause, mode of spread and method of prevention of Texas fever in cattle. "This not only made it possible to eradicate this disease but it contributed to the solution of problems connected with malaria and yellow fever," he said.

Other examples of veterinary research listed by the M.S.U. professor which have contributed to the promotion of public health were studies on hookworm, pleuropneumonia, foot and mouth disease, glanders fever, anthrax, symptomatic anthrax, brucellosis, tuberculosis, pullorum disease, New castle disease, equine encephalitis and hog cholera.

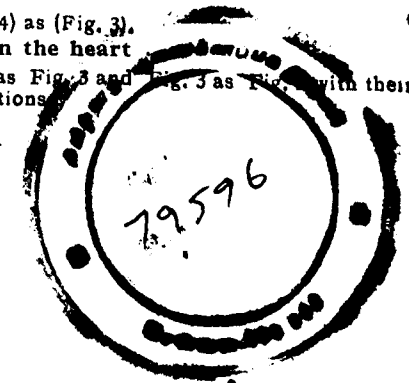
Dr. Stafseth also points out that leucosis complex in chickens has many features in common with cancer in man. Principles of epidemiology and problems connected with aging can obviously be studied to great advantage by use of experimental animals, he said.

Errata

Vol. XXXII, No. 5 (March 1956).

- | | |
|---------------------------|---|
| P. 343, Para-2, Line 1 | Read Morgani as Morgagni. |
| " " " 14 | Delete inverted commas before "Finestone. |
| " " " 16 | Read The believe as They believe. |
| P. 344 " 1, " 18 | Read Dafson as Davson (1945). |
| " " 2, " 9 | Read valulitis as valvulitis. |
| 345 " 3, " 2 | Read Von Gieson, and Elastic Stain as Van Gieson, and Elastic Stains. |
| 346 Under References 1. | Read E. E. Farris as E. J. Farris. |
| 2. | Read 39 : 39-90 as 39 : 89-90. |
| 6. | Read Loriche as Leriche. |
| 7. | Read Greig D. M., as Greig D. M. (1931). |
| 8. | Read J. Dafson as J. Davson. |
| 10. | Read Maximow A. A. 1, as Maximow A. A. |
| 348, Para-3, Line 2 | Read Hydatid Soolices (Fig. 3) as Hydatid Scolices (Fig. 4). |
| " " 3 " 4 | Read (Fig. 4) as (Fig. 3). |
| | Bone formation in the heart |
| Micro-photograph plate :— | Read Fig. 2 as Fig. 3 and Fig. 3 as Fig. 2 with their respective captions |

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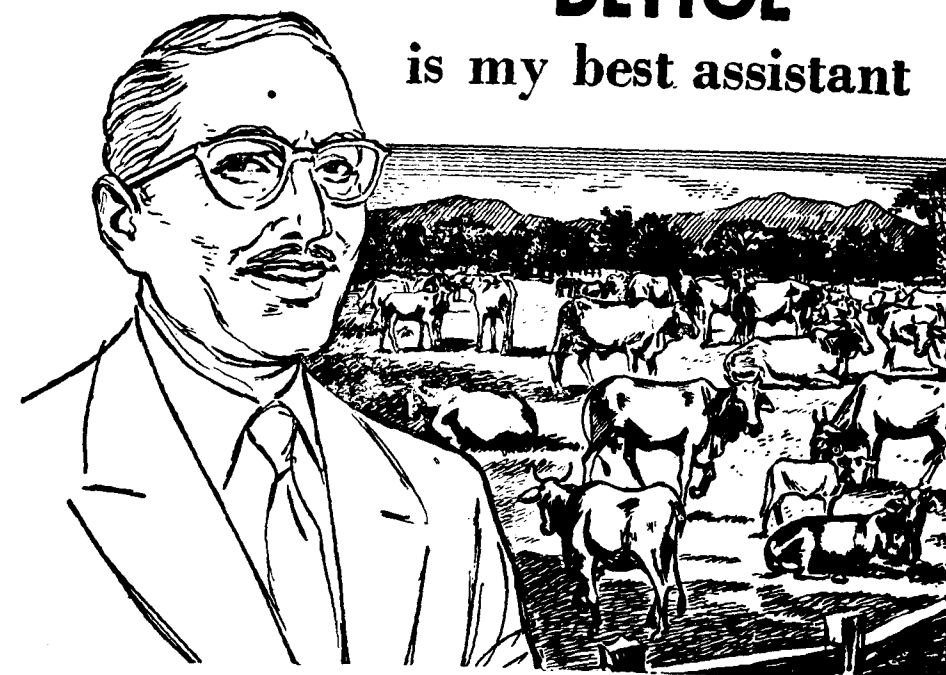
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