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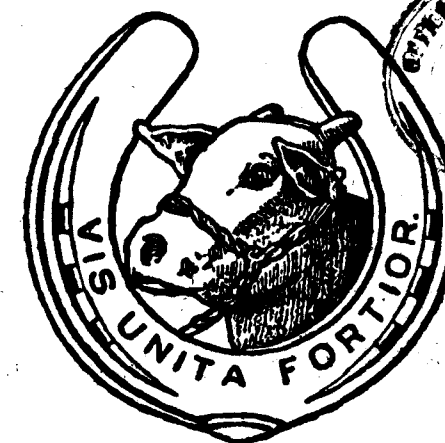
THE INDIAN VETERINARY JOURNAL

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(The Journal of the All-India Veterinary Association)

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[THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION]

PUBLISHED ON ALTERNATE MONTHS



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Devoted to the cause of the
Veterinary Profession



EDITOR

P. SRINIVASA RAO, G.M.V.C., Madras.

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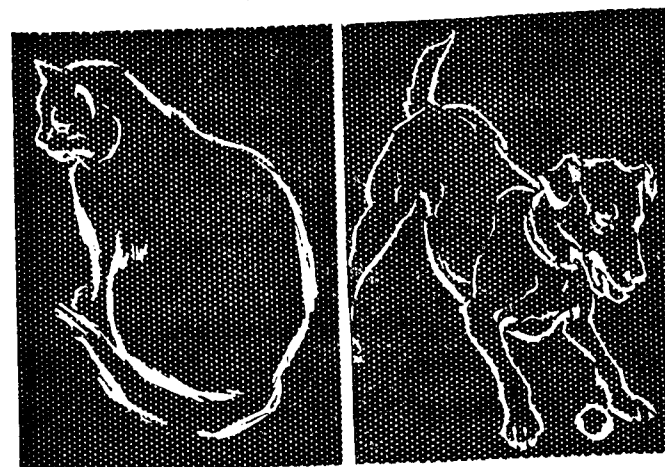
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THE Indian Veterinary Journal

(The Journal of the All-India Veterinary Association)

Vol. XXXI

JANUARY, 1955

No. 4

General Articles

HEPATITIS CONTAGIOSA CANIS (RUBARTH) IN INDIA

By

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Introduction

Recent researches in the field of canine diseases have revealed that the group of non-bacterial infections commonly designated as distemper comprises a number of distinct etiological entities. Work of Dunkin and Laidlaw (1926) in England following the original observations of Carre' (1905) established the specific nature of distemper virus and, more recently, the publications of MacIntyre *et al* (1948) showed that a distemper-like disease (Paradistemper, Hard Pad disease) with neurological signs and hyperkeratosis of foot-pads and nose was caused by a separate virus. This work has further proved that besides Distemper and Hard Pad disease, there were other closely allied canine disorders, each caused by a separate etiological agent. To this great group may now be listed the disease called Hepatitis contagiosa canis, first described in detail by Rubarth (1947).

This communication records the occurrence of Hepatitis contagiosa canis in this country for the first time. To enable veterinarians in India to recognise the disease, which apparently is not so uncommon, and to stimulate further work on the subject, relevant literature is also reviewed.

History and geographical distribution

The brilliant researches of Rubarth in Sweden, published in 1947, established that a specific disease with distinct lesions in the liver occurs in canines and that it is caused by a virus having great affinity for hepatic and endothelial cells. In view of the characteristic pathology so uniformly manifested in the liver, Rubarth designated it as Hepatitis contagiosa canis.

Although the disease was first described as a specific entity only in 1947, there were indications to show that it existed long before that time. Rubarth himself mentions of early observations on a disease with

similar liver pathology by Joest (1921), Cohrs (1929) and Hjarre (1928). In 1945 Rubarth showed the occurrence of inclusion bodies in the disease and speculated on its viral origin and in 1947 published the excellent monograph on the pathologico-anatomical, epizootological, etiological studies. Since this publication, the disease has been reported by workers from many countries of the world; Storm and Riser (1947), Coffin (1948), Riser (1948), Chaddock and Carlson (1950) and Craig (1950) from United States of America; Florent and Leunon (1949) from Belgium; Van den Akker (1952) from Netherlands; Cohrs (1952) from Germany; Whitten and Blood (1949) from Australia; Innes (1949), Pay (1950) and Parry (1950) from Great Britain. Commenting on the geographical distribution of the disease Rubarth (1954) states that the disease occurs in most of the European countries, United States of America and Canada and that from the materials received by him he believes that the disease seems to occur in Africa and Japan also.

In many countries evidence could further be brought forward to show that the disease existed much earlier than its first recognition. Thus in United States, Cowdry and Scott (1930) observed in their laboratory dogs a fatal disease that produced marked liver necrosis with intra-nuclear inclusion in hepatic cells. The lesions described by De Mon breun (1937) in his work on Canine distemper III are similar to what has been described by Rubarth. Also the disease of great mortality affecting foxes, coyotes and dogs described by Green *et al* (1933) showed liver lesions and localisation of inclusion bodies very similar to that of Hepatitis contagiosa canis.

Cohrs (1952) stated that in Germany from 1938 to 1951, 14 cases of Hepatitis contagiosa canis were diagnosed out of a total of 3008 canine autopsies.

In Great Britain Innes (1949) stated that a re-examination of histopathological slides from about 30 selected canine autopsies revealed 3 cases, and that the disease must have existed in 1935 if not many years earlier. Pay (1950) observed that a similar examination of liver sections from canine autopsies received in the Pathology department of Royal Veterinary College, London, yielded 8 cases with histological picture characteristic of Hepatitis contagiosa canis.

It is thus clear that in many countries the disease actually existed in an unrecognised fashion long before its first report and in this connection what Innes has stated may aptly be quoted "that no disease is ever 'recognised' until it is found in the first place and how on occasions we have not the eyes to see what is staring us in the face". Here in passing it may be pointed that such re-examination and identification of cases were made possible due to careful cataloguing and

indexing of pathological materials from autopsies, a practice I am afraid, not widely prevalent in this country. It was in this context that Innes emphasised the value of the establishment of a Bureau or Registry of Veterinary Pathology "in which would reside an enormous bulk of carefully catalogued clinico-pathological protocol of animal diseases complete with slides, photographs, blocks and tissues which could be studied by an interested observer whatever his speciality."

Autopsy protocols of the cases cited

It was anticipated from the clinical history and autopsy findings that the two cases cited here would finally prove to be contagious hepatitis on histological grounds. Relevant materials were fixed in 10% formol saline, sectioned and stained by H and E. These cases showed typical liver pathology and intranuclear inclusions in the hepatic and endothelial cells.

Case 1. Non-descript, male, 7 months. 7-2-54 (A. 48-54).

Clinical history :—Died suddenly.

Pathology :—Condition fair; superficial lymph nodes swollen and hyperaemic; about 40 c.c. of sero-sanguineous fluid in peritoneal cavity and about 20 c.c. of the same type of fluid in the pleural cavity; lungs highly oedematous; liver swollen, dark red, edges round and on section lobuli design very prominent; gall-bladder distinctly oedematous; left tonsil much swollen; intestinal contents, blood tinged in certain parts and its mucosa congested in patches and petechiated.

Most of the anatomical features mentioned by Rubarth are present in this case. Sections of the liver showed severe confluent centro-lobular necrosis (Plate No. 18 Fig. 1), dilatation and rupture of sinusoids. Severe sinus catarrh of lymph nodes with oedema and necrobiotic changes also present. Intranuclear inclusions could be seen with ease in hepatic cells and endothelium of the sinusoids of the liver.

Case 2. Dalmatian, male, 2 years. 13-3-54 (A. 94/54).

Clinical history :—Animal suffered acute pain all night and died.

Pathology :—Fair condition; superficial lymph nodes swollen and congested; fair amount of effusion in peritoneal cavity and pericardial sac; epicardium congested and right-sided dilation of heart; diffuse oedema and congestion of lungs; liver congested, soft and mottled on section; splenic pulp soft and malpighian bodies prominent; stomach oedematous and congested at the fundus; intestinal mucosa congested in patches.

In this case the amount of necrobiotic changes was not so severe as in the other, but lacunose dilatation of sinusoids (Plate No. 18 Fig. 3) with consequent atrophy and degeneration of liver cells, haemorrh-

hages and haemosiderosis were very markedly evident. The nuclear inclusion bodies were also not so numerous as in the other case.

Clinical picture

As Joshua (1950-a) remarked, "the disease was not merely a pathologist's dream—but it was a clinician's entity and it was going to be a vital matter in canine practice". She (1950-b) actually diagnosed two cases of the disease on clinical examination and both on autopsy were confirmed as Hepatitis contagiosa canis.

The disease affects dogs of all ages, but more often it causes death in puppies. Rubarth found that out of 180 cases where age was known, 149 were one year or less. The course varied considerably; in some cases the dog died before the owner could detect any sign of illness. This has happened in one of the cases cited here. As a rule the duration of the illness varied from 2-4 days, starting with apathy, loss of appetite and intense thirst. There may be oedema of head and neck, vomiting, diarrhoea and even dysentery. Frequently, the animal evinces pain on palpation of xiphi-sternal region. There is elevation of temperature above 104°F. at the onset. The temperature curve is usually of a 'saddle type' i.e. there is initial elevation for one day, then a drop for a day followed by a secondary rise. In most cases the decrease between elevations did not represent a return to normal, since initial and secondary rise were quite high (Baker *et al* 1954). There is tonsillitis, profuse lachrymation and occasional opacity of cornea.

On the day after initial rise of temperature there is leukopenia which persists throughout the febrile period. Differential blood count reveals decrease in neutrophils. There is prolongation of bleeding time for more than two minutes and this sign is of diagnostic value.

Sometimes simultaneous infection with viruses of Hepatitis contagiosa canis and distemper occurs. In such cases the clinical course is rapid, fever and leukopenic reactions severe, and mortality rate higher. In those that recover with such combined infections, the period of convalescence is much longer (Baker *et al* 1954).

Pathology

The basic change appears to be one of severe vascular damage resulting in haemorrhages in various organs and in this respect Rubarth states that the pathologico-anatomical picture in Hepatitis contagiosa canis apart from certain finer details, resembles that of canine shock.

The main anatomical features observed are (1) subcutaneous oedema in the region of shoulder and sternal region; (2) pallid mucosa which occasionally may be icteric; (3) acute lymphadenitis and tonsillitis; (4) peritoneal effusion, which may be sanguinous; (5) dilatation of right side of heart and sub-endocardial haemorrhage (6) slight enlargement of liver which shows on the cut surface, clear lobulation

Hepatitis Contagiosa Canis (Rubarth) in India

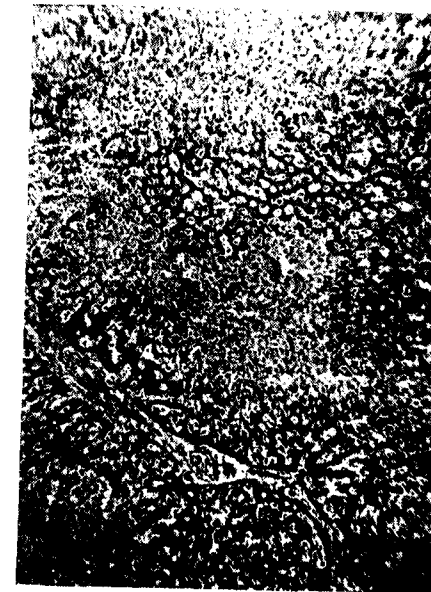


Fig. 1
Liver: (A 58/54).
Showing severe centrilobular necrosis.
H.E. × 48.



Fig. 2
Liver: (A 58/54).
Showing intranuclear inclusion in a
hepatic cell. H.E. × 400.

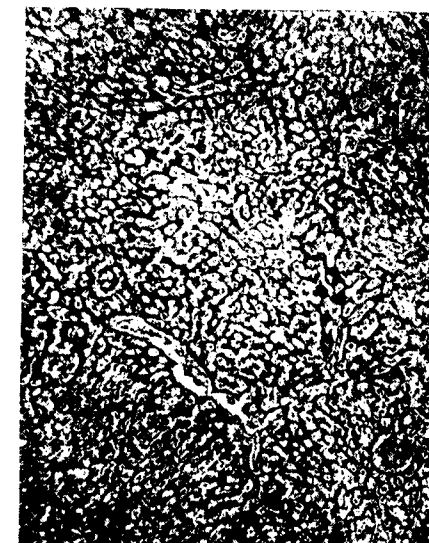


Fig. 3
Liver: (A 94/54).
Showing lacunose dilatation of sinusoids.
H.E. × 40.



Fig. 4
Kidney: (A 58/54).
Showing intranuclear inclusion body in the
endothelium of glomerular tuft.
H.E. × 535.

and some amount of dryness and on the surface, fibrinous deposits; (7) distinct sub-serous oedema of gall-bladder; (8) enlargement of spleen in some cases (9) oedema and petechiae of thymus in puppies; and (10) congestion of brain with occasional petechiae.

Histological changes in liver varies from mild degenerative changes to confluent contrilobular necrosis. The contrilobular cells show varying degrees of degenerative changes, as loss of cellular outlines, vacuolation and granular appearance of cytoplasm, karyorrhexis, pyknosis and margination of nuclear chromatin. The nuclei which show inclusion bodies are generally hypertrophic with clearly margined basi-chromatin. The inclusion bodies usually occurring as single in a nucleus are to be found besides in the hepatic cell, in the endothelium of sinusoids. They are round and stain acidophilic or basophilic (depending upon the mode of fixation and staining). The number of inclusions present in hepatic cells varies from none to as many as 20 per cent. Liver sections show lacunose dilation of sinusoids some of which may become ruptured and there is further marked increase in brown staining pigment which is probably haemosiderin.

Chief microscopic changes in the *spleen, lymph nodes and tonsils* are hyperaemia, haemorrhage, oedema and necrobiosis. Intranuclear inclusions similar to those seen in liver are to be found in fixed macrophages, sinusoidal littoral cells and endothelium of sheathed arteries of the spleen.

Brain shows no evidence of encephalitis but congestion of vessels and swelling and necrobiotic changes in the endothelium of these vessels. Nuclear inclusions could be detected in the endothelium of these vessels.

Diagnosis

Dogs especially young ones that show sudden acute illness, elevated temperature, thirst, pain on palpation at xiphi-sternal region and acutely inflamed tonsils, should be suspected for the disease. Marked leukopenia, and prolongation of bleeding time for more than two minutes in such animals are suggestive. However clinical signs are not sufficiently diagnostic to differentiate the condition from other non-bacterial infections of the dog. In cases that live sufficiently long, recourse to liver biopsy and demonstration of intranuclear bodies in hepatic cells will clinch the diagnosis.

In cases that die, characteristic pathological anatomy and demonstration of intranuclear inclusions in hepatic and endothelial cells are confirmatory.

Epizootology

From the apparent sporadic nature of the disease it may be assumed that the condition is not very wide-spread or contagious

in its manifestation. It has been shown by workers that occasionally in a kennel outbreaks of the disease with many abortive or clinically inapparent cases may occur. In outbreaks, in-contacts often show thermal reaction and subsequently recover. Such dogs in their sera show complement-fixing anti-bodies. In Germany Brunnel *et. al.* (1951) found that of 300 dogs tested for complement-fixing antibodies 136 were positive. Rubarth (1947) with the aid of C. F. test showed that in Sweden 70 per cent. of dogs of varying ages were positive and Florent and Leuren (1949) in 60 per cent of dogs in Belgium. Infection occurs through ingestion and during acute phase of the illness virus is present in all secretions and excretions. The virus persists for a longer period in urine.

Prevention and treatment

In countries where the disease shows a high incidence, therapy with antiserum and an inactivated tissue vaccine is practised. The former is administered in doses of 0.5 to 1.0 cc per pound body weight at intervals of 10-14 days. Immunization with inactivated vaccine should begin at 3-5 months age and must be repeated every 6-12 months.

Summary :

1. Two cases of Hepatitis Centagiosa Canis (Rubarth) have been reported for the first time in India.
2. The literature on the disease with particular reference to clinical picture and pathological changes are briefly reviewed to enable practitioners in diagnosing the infection.

Acknowledgments :

I am indebted to Dr. Sven Rubarth, Professor of Pathology, Royal Veterinary College, Stockholm, Sweden for kindly examining the sections from A. 48/54 and confirming my diagnosis. My thanks are due to Mr. Bertie A.D'Souza, Principal, Madras Veterinary College and to Sri V. R. Rajagopalan, Director of Animal Husbandry for their interest in this work. My thanks are also due to Sri. M. R. Jambulingam, the College Artist for the photographs in this paper.

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A NOTE ON THE INCIDENCE OF TUBERCULOSIS IN ZEBU (HARIANA) CATTLE IN THE PUNJAB (INDIA)

By

G. C. TANEJA,

(Department of Physiology, University of Queensland, Brisbane).

I. Material

Data for the present investigation were collected on a Haryana herd in the Agrova Gowshala (District Hissar). Gowshalas in India are the centers where the old animals are taken care of. They are run usually by the public funds. Besides the old animals, most of the gowshalas also maintain a fair number of milking animals which are donated by the public.

The cattle are grazed on the natural pastures. They are driven out in the morning for grazing and are herded in the gowshala in the evening. Milking cows and the young bulls are stall fed especially during the period of drought. The management of cattle in the gowshalas is better than in the average herds.

II. Technique

In August 1949, the herd of 102 heads of Haryana cattle of the Agrova gowshala were tested for Tuberculosis by the *Double Intra-Dermal Test*. The standard preparation of Tuberculin as supplied by the Indian Veterinary Research Institute was used.

The fold of skin on the left side of the neck region was shaved and the thickness of the fold was measured with a pair of sliding callipers calibrated to 0.1 m.m. An intradermal injection of 0.2 c.c. of the standard preparation of tuberculin as a sensitizing dose was given. In all cases, the formation of a bead was observed after a successful injection. Twenty four hours after the first injection the thickness of the fold of the skin at the site of the injection was measured again. The second injection of 0.1 c.c. of tuberculin as a diagnostic dose was given at the same site. Twenty-four hours after the second injection, the thickness of the fold of the skin at the site of the injection was measured and the nature of the swelling was recorded. Diffuse, hot and painful swelling at the site of injection and the thickness of the fold if it was twice, or more than twice, the thickness of the original fold of skin, were the main indications of a positive case. In doubtful cases, the swelling increased more than twice the original thickness of the skin but the site of injection was not found to be hot, painful with a diffuse swelling. The rest of the cases were regarded as negative.

III. Results

Since the average breeding age of cattle is 3 years, all the animals up to and under this age were grouped together. The rest of data were sorted into 3 age groups—4 to 9 years, 10 to 15 years and, 16 to 21 years of age. The results for each sex and also combined for both sexes are presented in Table, 1, 2 and 3.

TABLE I

Incidence of Tuberculosis in a herd of Zebu (Haryana)
cattle as tested by the double intra-dermal test.

(Females)

Age group	Positive	Doubtful	Negative	Total	% Positive
1— 3 years	2	—	23	25	8.0
4— 9 years	14	—	15	29	48.3
10—15 years	4	3	14	21	28.6
16—21 years	1	—	3	4	25.0
Total	21	3	55	79	30.4

% Positive includes doubtful cases as positive.

TABLE II

Incidence of Tuberculosis in a herd of Zebu (Haryana)
cattle as tested by the double intra-dermal test.

(Males)

Age group	Positive	Doubtful	Negative	Total	% Positive
1— 3 years	—	1	13	14	7.1
4— 9 years	1	—	1	2	50.0
10—15 years	4	1	1	6	83.3
16—21 years	1	—	—	1	100.0
Total	6	2	15	23	34.8

% Positive includes doubtful cases as positive.

Number is too small for reliance on % Positive.

TABLE III

Incidence of Tuberculosis in a herd of Zebu (Haryana)
cattle as tested by the double intra-dermal test.

(Both sexes combined)

Age group	Positive	Doubtful	Negative	Total	% Positive
1— 3 years	2	1	36	39	7.7
4— 9 years	15	—	16	31	48.4
10—15 years	8	4	15	27	44.4
16—21 years	2	—	3	5	40.0
Total	27	5	71	102	31.4

% Positive includes doubtful cases as positive.

Data are, of course, not adequate but certain conclusions can be drawn. The percentages of positive (including doubtful as positive) cases are 34.8, 30.4 and 41.4 for the male, female and total respectively. There does not appear, therefore, to be much difference between the sexes.

The effect of age is more obvious. The age group, 1-3 years, showed an incidence of less than 8 per cent. whereas the groups, 4 years and older had an incidence of more than 45 per cent. positive.

IV. Discussion

Whether such a high incidence of Tuberculosis in Zebu (Haryana) cattle is common in India, is open to question. The figures are certainly much higher than those quoted by Francis (1947). The present note, however, indicates a situation which warrants the detection of tuberculous animals to help check by isolation. No open clinical case of tuberculosis was observed nor was the milk tested for the presence of tubercle bacilli, and therefore little can be said about the effect of milk from this herd on the public health.

V. Acknowledgments

The author acknowledges his thanks to Professor J. Francis,* Veterinary School, University of Queensland for his criticism and advice. He is also thankful to the staff of the Punjab Veterinary College, Hissar, especially Major A. C. Aggarwala and Mr. M. S. Malhi for providing facilities for carrying out this test.

It would have been better if the number tested under each age group has been given. (*Editor I.V.J.*)

SHEEP BREEDING IN THE PUNJAB

By

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Sheep is the most adaptable food consumer on the farm and utilises a great variety of grasses, weeds, stubble, grams, etc. more efficiently than any other species of domestic animals. These animals return a very large quantity of fertilising constituents to the soil, their manure is more evenly distributed over the ground and they are more effective in maintaining or enriching soil fertility. Sheep require less labour for their maintenance than any other class of animals. They have been rightly referred to as possessing "golden hoof" because of their ability to maintain the fertility of their pastures or to restore the productivity of the soil.

It returns two cash crops, namely, lambs and wool. Returns come quickly since lambs are born every year and are ready for market when about a year of age. The income from the fleece is usually

TABLE I
Showing distribution of sheep in the world.

S. No.	Country.	Population in thousand.	S. No.	Country.	Population in thousand.
1.	Australia	1,05,371	9.	Brazil	13,283
2.	U.S.S.R.	70,000	10.	China	8,087
3.	Argentina	56,182	11.	France	6,632
4.	U.S.A.	42,436	12.	Italy	6,600
5.	India	37,728	13.	Pakistan	5,931
6.	Newzealand	33,975	14.	Canada	3,622
7.	Turkey	23,386	15.	Denmark	213
8.	United Kingdom.	20,150			

*Francis (1947). Bovine Tuberculosis. Staples Press, London.

obtained at a time of year different from the income of lambs thus making a better distribution of earnings.

There are about 755,400,000 head of sheep in the world. The leading sheep producing countries* in order of population are Australia, Union of Soviet Socialist Republic, Argentine, United States of America, Indian Union, Newzealand, Turkey and United Kingdom (Table I).

In India there are about 37,728,000 sheep. The nine States leading in numbers of sheep (1945) are as follows: Madras, Uttar Pradesh, Bombay, Punjab, Bihar, C. P. and Berar, West Bengal, Orissa and Assam.

Distribution of sheep in Punjab.—Punjab has 950000 heads of sheep. Though it stands fourth in the States leading in the number of sheep population, still it ranks second in the Union when sheep per thousand acres of land and sheep per 1000 human population are considered (Table II).

Sheep breeding has been a paying branch of pastoral farming in the Punjab from quite early days. Figures appertaining to their periodic population, yearly decrease or increase (Table III) indicate that there was a very satisfactory increase in population in 1908-1909 as compared to 1903-04, and the upward trend was maintained upto 1913-14. During 1919-20 census, there was a rapid fall in their number very likely due to heavy consumption of meat and meat products during the World War I (1914-18). Again there was a steady rise in the percentage increase from 1922-23 to 1940-41 with a negligible decrease during 1935-36 census. A heavy decrease was observed during 1945-46 which is also attributable to mutton and mutton products being in great demand for Army during World War II. The partitioning of the country gave a severe set back to sheep industry in this State as is evident from a heavy percentage decrease in their population in 1951-52. The main reasons for this heavy and sudden fall were the mass migration of these animals with their Muslim owners "Odes" to Pakistan and the increase in the mutton eating population of the State as a result of their migration from West Pakistan and also due to the consumption of mutton by troops stationed on border-post of the Punjab.

* Source : Livestock Census 1945. Year Book of Food and Agricultural Statistics, 1947.

TABLE II

Distribution of sheep in the different States of India in relation to total area and human population.

State.	No. of Sheep (in thousand).	Percentage of total No.	Total area (thousand acres).	No. of sheep per thousand acres.	Human population (thousands).	No. of sheep per 1000 human population.
Assam	27	0.2	36,423	1	7,685	3.5
Bihar	737	4.3	44,327	17	36,546	20.0
Bombay	4816	10.7	48,722	37	29,384	62.5
C. P. & Berar	356	2.1	63,078	6	19,648	18.1
Madras	10569	62.4	80,012	132	49,841	234
Orissa	283	1.7	20,142	14	13,768	20.6
Punjab	950	5.6	23,236	43	12,181	78.1
U. P.	1847	11.0	68,054	28	56,346	33.2
West Bengal	339	2.0	29,476	11	21,837	15.6
Indian Union	**16951		781,649	48		

** Source: Livestock Vety: & Fisheries Statistics, Punjab, Economic and statistical Organisation Publication No. 3, 1951.

TABLE III

*Estimated number of sheep in the Joint Punjab
with yearly variation.*

Year.	No. of sheep (in thousand).	Yearly decrease or increase (in thousand).	Percentage decrease or increase.
1903-04	4,100	—	—
1908-09	4,600	500	12.2
1913-14	4,700	100	2.2
1919-20	4,000	-700	-14.9
1922-23	4,100	100	2.5
1927-28	4,395	295	7.2
1929-30	4,458	63	1.4
1935-36	4,424	-34	-0.8
1940-41	5,328	904	20.4
1945-46	4,136	-1192	-22.4
1951-52	615	-3521	-85.1
Punjab (India)			

Out of the 13 districts of the State, the main sheep producing districts both in respect of sheep population and number of sheep per 1000 human beings are Kangra, Hissar and Ferozepur (Table IV). This is a good indication of the favourable environments existing in these districts to be surplus in wool and mutton and thus improving the economic life of the local shepherds. The sheep population is at its minimum in canal irrigated districts as Hoshiarpur, Amritsar and Jullundur where the geological conditions are ideal for the propagation of different parasites and thus do not provide optimum conditions for breeding of large flocks. Consumption of mutton and lamb is heaviest in Amritsar, Gurdaspur, Ambala and Ferozepur districts and is lowest in Hissar, Rohtak and Kangra districts which although are the home tracts of certain breeds of sheep but the majority of their inhabitants are vegetarian.

Breeds of sheep.—Sheep are raised at various elevations and in different temperatures ranging from 115°F to 50°F. They are kept in some areas that are hot and dry and are pastured in the infertile soils as well as on highly fertile places found in the Himalayas. The Nomads (Gaddis) use these high mountains which furnish excellent grazing for sheep during the summer months when there is abundance of water and good pasturage and the days are cool. During spring and autumn the foot hills are used to good advantage. The plains and the semi-desert areas, which are too hot and dry in summer furnish winter pastures. Breeds of sheep in the Punjab, therefore, are raised to suit particular climates. The following distinct breeds thrive well in the areas where they are met with.

(1) *Bikaneri sheep.*—The original home of this breed, as the name indicates, is Bikaner State but it has widely extended in the adjoining

TABLE IV
Showing sheep population in relation to total area and human population
in the different districts of the Punjab.

District.	No. of sheep	Percentage of total No.	Total area (thousand acres)	No. of sheep per thousand sand acres total area.	Human population.	No. of sheep per 1,000 human population.	District.	No. of sheep	Percentage of total No.	Total area (thousand acres)	No. of sheep per thousand sand acres total area.	Human population.	No. of sheep per 1,000 human population.
Ambala Division :													
Hissar	195,012	20.5	3461	53	981,778	198.6	Kangra	244,034	25.7	5648	43	949,317	257.1
Rohtak	53,955	5.7	1494	36	1076,320	50.1	Hoshiarpur	14,300	1.5	1415	10	1066,333	13.4
Gurgaon	56,500	5.9	1477	38	859,943	65.7	Jullundur	17,109	1.8	858	30	969,021	17.7
Karnal	81,223	8.6	2019	40	1110,448	73.1	Ludhiana	37,155	3.9	893	42	786,687	47.3
Ambala	31,499	3.3	1193	26	845,969	37.2	Ferozepur	145,294	15.3	2601	56	1333,220	109.7
Simla	3,000	0.3	67	45	876,37	34.2	Amritsar	26,605	2.8	1256	21	1315,960	20.2
							Gurdaspur	44,124	4.6	854	52	805,075	54.5
Total	421,189						Total	528,621					
Jullundur Division :													

districts of Punjab such as Hissar, Rohtak, Gurgaon, Ferozepur and Ludhiana. These animals are quite hardy and can withstand drought and famine conditions very well. Although it is a breed of deserts yet it does very well even at higher altitudes.

It is a medium sized hornless sheep with a comparatively small head, short stumpy ears, long face, bright prominent eyes and compact body and with a tail well above the hocks. The colour of the face varies from white to tan or even black. The wool of the body is generally white, long and coarse. It is reputed to grow the world's best carpet wool which is highly prized in the European and United States markets. The average body weight of the best flocks ranges between 65 to 75 lbs. Average wool yield in two clips per year is $4\frac{1}{2}$ to 5 lbs. The average body measurements are length 23 inches, height 25 inches and girth about 28 inches. The staple length of wool is $3\frac{1}{2}$ to 5 inches.

(2) *Gaddi sheep*.—This breed which is solely distributed in the Kangra district, the foothills of "Himalayas", is often known as a hill breed. Large semi migratory flocks are often noticed in Kistwar and Badharwah tehsils in Jammu Province of the Kashmir State. Gaddies are a hill tribe who are traditional sheep breeders raising this breed. The sheep has a small size, small sturdy legs, medium tail, medium ears and a lustrous long wool. Rams are mostly horned, ewes hornless, face marks are brown or black. Average body weight is 60 to 65 lbs. Average body measurements are height $25\frac{1}{2}$ inches, length $27\frac{1}{2}$ inches and girth 36 inches. Wool yield ranges between 2-3 lbs. in 2 or 3 clips per year. Mostly white on the body but occasionally spotted or even whole coloured sheep (black and fawn) are also encountered.

(3) *Biangi sheep*.—This is an allied breed to Gaddi sheep but is located in the higher ranges of the Kangra valley in Lahaul and Spitti areas. Their number is comparatively very small. These are bigger type sheep with heavier yield of wool containing large proportion of fine soft fibres. 50% of the wool samples from these sheep are often good apparel wool with less than 5% medullations in the fleece. The sheep seldom come to the lower ranges except the culls which are sold in Kulu for mutton. This breed is often used as a pack animal for exchange of commodities between the higher and the lower range areas.

(4) *Lohi Sheep*.—The home of this breed lies in Multan and Montgomery districts of West Punjab (Pakistan) but it is also found in the border districts of Ferozepur and Amritsar in this State.

It has a large sized white body with a big heavy head of reddish brown, dark brown, or black colour. The face is devoid of wool with a characteristic Roman nose. The ears are very long (12" to 15") and

drooping. Horns are absent in both sexes. The legs are strong with well developed brisket. The tail is short, thick and stumpy, 2-4" and appears to have been docked. Some sheep possess small cartilaginous out-growth on the ears known as secondary ears. The udder is well shaped with long teats and is well known for its milk yield. Average yield of milk is 2½ lbs., the maximum being 5 lbs. per day. The wool is long, coarse and of carpet type. The staple length ranges between 2" to 3½" in 6 months growth. The average fleece weight in 2 clips per year ranges between 3 to 3½ lbs. The average body weight is between 90 to 100 lbs. though rams weigh 150 to 160 lbs. The breed is highly prized for its mutton quality and the proportion of dressed carcass from the live weight is 45%.

(5) *Hissar-dale sheep*.—This breed has been evolved at the Government live stock Farm, Hissar by crossing Australian Merino rams with Bikaneri ewes. It contains 7/8 Marino blood and breeds true to type. The characteristic features are a medium size, all white on the body, medium leaf like ears, long tail and dense merino type wool. Average body weight is 70 to 80 lbs. in the ewe and 120 to 130 lbs. in rams. The average fleece weight (greasy) is from 5 to 6 lbs. in 2 clips per year. In the rams the maximum fleece weight goes upto 12 to 13 lbs. The wool is 58 s to 60 s with a staple length of 1½ to 2" in 6 months growth. Horns are sometimes present in males but ewes are hornless. The wool shows typical merino character though lacks somewhat in softness and grease.

Extension service.—To achieve any measure of lasting improvement and success in sheep breeding, it is necessary to concentrate first on the building up of indigenous sheep that possess definite but desirable characters, to suit the particular area and the climate. Much improvement has already been achieved by selective breeding of Bikaneri sheep at the Government Livestock Farm, Hissar for evolving a true wool type sheep. A fine wool type sheep 'the Hissar dale' has also been evolved by cross breeding of Australian Merino rams with Bikaneri sheep but it could not gain much popularity amidst the breeders due to high mortality amongst their progeny and for want of suitable market for the fine wool in the country. The pure 'A' type Bikaneri flock having been established at the Hissar Farm, the work is being extended to villages in selected sheep raising districts of the State in order to effect improvement in the existing sheep types. About 100 Bikaneri rams are issued every year to bonafide sheep breeders in the State at a concessional rate of Rs. 10 per animal. The process is though slower than cross breeding but still, the indigenous sheep being already adapted to local environments, there are no risks in facing high mortality as encountered in the cross bred stock. Consequently the wool quality will improve

gradually. In order to bring about rapid improvement in the sheep types by selective breeding, the introduction of artificial insemination in the breeding plan is engaging serious attention of the Animal Husbandry authorities of the State.

The Punjab Government have now decided to establish two seasonal demonstration centres at Fazilka (Distt: Ferozepur) and Panipat (Distt: Karnal) to commence functioning shortly for demonstrating to shepherds and others interested in sheep breeding and wool production, the best methods of washing and drying of sheep, clipping, grading and sorting of wool etc. The centres will be financed by the Department of Industries and will work under the technical guidance of Civil Veterinary Department, Punjab. The object of this scheme is to bring home to the sheep breeders the scientific, profitable and economic methods of wool production. It is expected that with the above reorientation of sheep breeding policy there will be a distinct improvement in the breed of sheep in the State. This would prove beneficial to the shepherd in raising his income and standard of living as also would increase the production of wool and mutton in the State.

ROLE OF ANTIBIOTICS IN SWINE ENTERPRISE

By

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Introduction

The demonstration that penicillin was of use in medicine caused a great deal of attention to be focussed on the phenomenon of microbial antagonism and on the chemical substances concerned, of which penicillin provides an interesting and in some ways still the most remarkable example. At present time there can scarcely be a country where scientific research is seriously undertaken, in which investigations of one kind or another into naturally occurring antibacterial substances are not being made and in which the products of research in this field are not employed in the clinic.

The term antibiotic which is now in general currency, has been defined by Waksman (cited by Florey *et al.*, 1949) as a substance produced by one micro-organism which is antagonistic to the growth of others. In this paper, plant products with antimicrobial properties have

been included; these are often referred to in the literature as antibiotics, though strictly speaking it is doubtful whether the term should be applied to them. In this paper no consideration has been given to antibacterial substances of animal origin, such as lysozyme, nor is the complex phenomenon associated with bacteriophage. Bacteria, moulds, green plants and even animals produce antibiotics. The antibiotics which are most widely known are those manufactured by special fermentations and which are used in the treatment of diseases. These include aureomycin, penicillin, streptomycin, chloromycetin and terramycin. All these antibiotics have been tested for their effect in producing growth, when added to the diet of chickens and pigs. In addition, neomycin and bacitracin which are not used in the internal medicine, have been tested in animal nutrition.

Early History

In the field of modern medical practice Mosse (1852) was apparently the first to suggest in a medical journal the use of a micro-organism for therapeutic purposes. He used yeast against boils on the prevailing furunculoid epidemic. This was the first medical use of micro-organism yeast. Maddern (1946) in a letter to A. M. A. pointed out that Tyndall, principally a physicist, described in 1876 the antagonistic action of a species of penicillin to a bacterial growth. Tyndall failed to recognize the probable cause, and he attributed that this arrest was due to the interference with O_2 uptake of the bacteria. This was the first observation of fungi.

We owe the first clear description of bacterial antagonism to Pasteur and Joubert (1877) who were experimenting with *Anthrax bacilli*. *A. bacilli* grew well in alkaline urine medium, but when the medium was previously incorporated with "common bacteria" the *A. bacilli* growth was arrested and dead ultimately. It seems, from a letter that Pasteur wrote to Dumas (1880), that Pasteur's idea were centered on immunity rather than on directly bacterial antagonism, as the in vitro result was an antagonistic phenomenon due to the production of a chemical substance. It is a question whether their animal results were due to this. Bâbes (1885) was apparently the first to demonstrate on solid as well as in liquid media that one organism could elaborate a substance which would stop the growth of another. When the mutual organisms of bacteria were sufficiently far advanced, a disease caused by one bacterium could probably be treated by another. The method of demonstrating inhibitions on solid media differs little from some of those in use to-day. He noted that a *Staphylococcus* inhibited the growth of other *Staphylococci* and of *B. anthracis*, and suppressed pigment formation by *Chromobacterium prodigiosum* and *Pseudomonas pyocyanea*, though the growth of these organisms was not inhibited.

In 1880, Freudenberg reported experiments in which various organisms were cultivated in beef broth for from four to six weeks. After filtration, the broth was sown with other organisms to test its power of inhibiting bacterial growth. The most notable inhibitions were produced by *P. pyocyanea* and *Bacillus phosphoresceus*.

Doehle (1889) stated that a non-pathogenic *Coccus* could inhibit the growth of *A. bacilli*. His best method of showing antagonism was to pour plates of melted gelatin or agar preseeded with *A. bacilli* and to streak the surface with the *Coccus*, preferably from a fresh culture in the form of a square. Complete inhibition was seen in the centre of the plate, which was apparently the first illustration of antibiosis.

It was in 1889 that the first use of the word "antibiosis" occurred. Vuillemin (1889) introducing it, said, "No one considers the lion which leaps on its prey to be a parasite nor the snake which injects venom into the wound of its victim before eating it. Here there is nothing equivocal; one creature destroys the life of another to preserve its own; the first is completely active, the second completely passive. The one is in absolute opposition to the life of the other. The conception is so simple that none ever thought of giving it a name. This condition, instead of being examined in isolation can appear as a factor in more complex phenomena. In order to simplify words we call it antibiosis, the active individual will be the "antibiot": the passive individual the "support".

In 1896, Gosio recorded the first isolation of an antibiotic in a crystalline form while he was working on the cause of pellegra, which was then attributed to the spoiled maize consumed by the Italians. The spoiling was due to the action of fungi, one of which Gosio isolated and called *Penicillium glaucum*, though it was almost certainly *Penicillium brevicompactum* as confirmed by Clutterbuck, Lovell, Raistrick (1932). From the cultures of this fungus he obtained small amounts of a phenolic substance in crystalline form, and since he recognized that it was a phenol which he thought it of interest to make antibacterial tests. He found that a solution of the crystals inhibited the growth of *B. anthracis*. An antibiotic-penicillic acid, was isolated in crystalline form from *Penicillium puberulum* by Alsberg and Black in 1931. They were like Gosio, looking for a "toxin" in spoiled maize and were not investigating the antibiotic properties of the fungus, but they recorded that the substance was capable of inhibiting the growth of *Bacterium coli*.

In 1929 Fleming (Nobel Prize Winner in Medicine in 1945—cited in Handy Encyclopedia, 1948) published the results of his observations on an accidental fungal contaminant identified at the time was *Peni-*

cillium rubrum. This fungus produced lysis of neighbouring *Staphylococcal* colonies, and when subcultured into liquid medium the broth on which it had developed killed or inhibited growth of a number of organisms pathogenic to man. His investigations established that the antibacterial broth, which he called penicillin, was a remarkable antiseptic in that it was much more harmful to bacteria than to the animal cells, and led him to propose that the broth might be valuable for local application to superficial infections such as ulcers in man. Several metabolic products of this fungus were studied by Clutterbuck, Lovell and Raistrick and important observations were made on the active substance in the metabolism fluid and on its behaviour towards solvents. However, penicillin was not extracted and no further investigation was made of its chemical or biological properties since that time it was believed to be too labile to make further study worthwhile. The same view of lability of the substance was also held by Reid (1935), who appears to have been the only person who worked on this fungal product after Raistrick and his colleagues abandoned it, until investigation was undertaken at Oxford by Chain, Florey, Gardner, Heatley, Jennings, Orr Ewing, and Sanders in 1940. The Oxford work resulted in the preparation of a dry, stable extract penicillin. Antibiotic research then received a great impetus when it was discovered at Oxford in 1940 (Chain, *et al.*) in that penicillin belonged to the rare class of drug, the systematic chemotherapeutic agent. This clearly distinguished penicillin from all antibiotics which had been investigated previously and as the drug was relatively soon introduced into the clinic and achieved widespread success then. Most antibiotic work since that date has had its object the discovery and isolation of hundreds of naturally occurring antibacterial substances, and in the hope of finding others endowed with useful therapeutic properties, and nutritional value.

Effects of Antibiotics in Swine Nutrition

Effect on Growth.—In April, 1949 it was first reported by Stokstad *et al.*, that products derived from aureomycin fermentation promoted growth of chicks and this growth could not be attributed to Vitamin B₁₂. Cunha and co-workers (1949 a, 1949 b) demonstrated for pigs the superiority of aureomycin fermentation products (at that time referred to as Lederle APF-5) over materials which contained only Vitamin B₁₂ as a growth promoting agent. Cunha *et al.*, (1951) used a control ration, peanut meal, minerals (including trace minerals) and Vitamins A and D, thiamin, riboflavin, niacin, pantothenic acid, pyridoxine, choline and folic acid. They found that aureomycin supplementation ration increased rate of growth. They stated that possibly aureomycin contains Vitamin B₁₂, aureomycin and possibly another factor(s). Since aureo-

mycin supplementation, in addition, gave no further growth response, they compared the effects of aureomycin, streptomycin and penicillin. They found greatest response with aureomycin, least with streptomycin and none with penicillin.

Catron *et al.*, (1949) studied the effects of aureomycin fermentation products and found an increase in the rate of growth of pigs and similar observations were made by Dyer (1950) at the University of Illinois, U.S.A. Luecke and co-workers (1951) found that aureomycin fed at levels of 10 mg. per pound of feed increased significantly the growth rate of young pigs. Penicillin was also found to be effective at levels of 1-5 mg. per pound of feed, streptomycin fed at levels of 10 mg. per pound of feed, resulted in a small increase in the growth of young pigs, which was not statistically significant.

Edwards *et al.* (1950) stated that aureomycin supplementation produced considerable growth response with the pigs when added to a diet containing Vitamin B₁₂. They were of the opinion that this supplementation contained some other factor (s) than aureomycin and B₁₂ which was responsible for accelerating growth of pigs profoundly.

Becker *et al.* (1951 b) stated that when the basal ration consisting of corn, soybean oil meal, bone meal mineral mixture, Vitamins A and D supplement, Vitamin B supplement, was fortified with aureomycin, penicillin, neomycin, chloromycetin at the level of 5 mg. per pound of feed, significant growth response was noted in pigs with former two antibiotics, but slight with the latter two.

Brown *et al.* (1951) stated the predominant influence of dietary aureomycin in the rate of gain of pigs. Hoefer *et al.* (1951) stated the effect of terramycin (5 mg. per pound of ration) to rations containing different levels of protein (15% and 18%) in the daily gain of weaning pigs. They found that the daily gains of pigs receiving high protein basal plus terramycin and low protein basal plus terramycin were 1.55 lb. and 1.57 lb. respectively. Luther *et al.* (1951) observed the effect of long time antibiotics feeding practices on the growth of the pigs. They used terramycin at the level of 8 gm. per ton in the gestation, lactation, and creep ration. They found 20-45% increase in growth at 8 weeks, 8-15% at market rate. Similar results were also noted with stable penicillin. Ramocidin, a new antibiotic effective against yeast and mould, but in-effective against bacteria gave a 51% increase in the rate of growth at 8 weeks.

Noland *et al.* (1951) observed the effects of aureomycin, terramycin and penicillin in the synthetic milk diet of baby pigs (2 days old baby pigs). Pigs receiving aureomycin and terramycin increased in rate of growth, but pigs failed to respond to the penicillin supplement

to the same extent as they did to the other two. Terrill *et al.* (1951 b) noticed that fastest gains occurred when bacitracin was included in the ration for the entire period from weaning to 200 lbs.

Effect on scours.—Catron *et al.* (1950) observed that pigs receiving aureomycin showed less scouring than their litter mates or other pigs whose ration was lacking in this antibiotic. Lepley *et al.* (1950) observed similar result in pigs receiving aureomycin. Heidebrecht and his associates (1950) working with older animals concluded that aureomycin fermentation products afforded considerable protection to sows and pigs exposed to an infectious type of enteritis. Stokstad (1950) stated that aureomycin is effective in decreasing the incidence of diarrhoea.

Powick *et al.* (1951) working on the relative effects of aureomycin, B₁₂ and nicotinic acid and their combinations upon the resistance to artificial infection with *Salmonella choleraesuis* on 32 pigs of 50 to 62 days of age with average body weight of 12.5 kg. stated highly significant effect in pigs receiving aureomycin and nicotinic acid. Carpenter (1950 and 1951) observed that by reducing the level of antibiotic supplement at weaning time or three weeks after weaning, resulted in an increase in the incidence of diarrhoea. Becker *et al.* (1951 a) observed, in general, that scours were less evident in those lots that were fed antibiotics.

Effect on food efficiency.—Cunha *et al.* (1950) Briggs *et al.* (1950) Catron *et al.* (1950) Barrick *et al.* (1950) showed the effect of aureomycin fermentation products on feed utilization of pigs. The feed consumed per 100 pounds gain by pigs with aureomycin supplement was much less than the control groups. Cunha *et al.* (1950) also noticed the increase of haemoglobin level of pigs fed with this supplement. Similar results were obtained by Becker *et al.* (1951 b) in these experiments using aureomycin, terramycin, procaine penicillin, arsonic acid. Noland *et al.* (1951) observed similar results with aureomycin mixed in an alpha-protein synthetic milk fed to 2 days old baby pigs for a period of 3 weeks.

Effect on gestating and lactating swine.—Carpenter (1951) observed that addition of antibiotics in the ration of gestating swine did not affect the litter size nor the size and livability of the newly born pigs. He also observed the average weight loss of test dams. It was 27 pounds less than the control dams in the April farrowing, whereas the weight loss in May farrowing of two groups was the same. The feed consumption of test dams was comparatively more than the control dams.

Effect on runt pigs.—Carpenter (1950) and Cuff *et al.* (1950) found that a very high proportion of runt pigs could be saved and caused

to grow rapidly by using aureomycin fermentation products in the ration. The value of antibiotic feeding supplement in the rearing of unthrifty or "runt" pigs has been referred to by Shanks (1952) who has recorded the successful use of an aureomycin fermentation product (Aurofac", Lederle) for a similar purpose on farms in the North Scotland area. Worden and Bunyan (1952) using a group of 10 "runt" Large White pigs, ranging in weight from 11 to 23 lbs. at 67 to 70 days of age, were able to rear when all meal ration was fortified with an antibiotic feeding supplement providing 8 mg. procaine penicillin per pound of food consumed.

Effect on Creep Rations.—Carpenter (1951) observed that pigs in whose rations antibiotics were added consumed more pounds of creep feed than the pigs in whose rations they were lacking. He, in addition, obtained 36 pounds of average weaning weight at 8 weeks against 25 pounds in the controls.

Effect on pigs in Pasture.—Lepley *et al.* (1950) observed increased average daily gains in pigs both on pasture and on dry lots. But experiments conducted by Vestal (1950) indicated that antibiotic given to pigs on good alfalfa pasture would result in exceptionally rapid gains. Similar results were obtained with oat and rape pasture. Brinegar *et al.* (1951) observed that pigs receiving the antibiotic supplement consumed more pasture.

Effect on Rations Containing Animal Products.—Lepley *et al.* (1950) observed that the addition of meat and bone scraps did not significantly increase the gain in pigs already receiving the dried whole aureomycin mash, but, however, the improvement was apparent. There was no interaction between the effects due to the dried whole aureomycin mash and bone scrap. On all-plant-diet the addition of aureomycin fermentation products would give an increase in growth rate of pigs superior to that obtained by supplementating the ration(s) with animal products. Stokstad (1950) stated that antibiotics gave a response in diets containing animal products, even though these products at the level fed, might contain sufficient Vitamin B₁₂ to supply the requirements.

Mode of Action of Antibiotics in Stimulating Growth.

Antibiotics, because of their profound effect in stimulating the growth of animals, especially in young life, are often called the growth stimulators. Though these wonder drugs or agents play very important parts in swine nutrition, it is still not very clearly understood as to their mode of actions in the system. From the works of the various investigators and Scott (1954) the way or ways by which these antibiotics act in promoting growth can be summarised.

(1) *Disease level theory.* By this the infection of low order is prevented. Animals harbouring such infection get the better chance in utilizing the feed that is made available to them.

(2) *Stimulate feed consumption.*—Antibiotics promote growth by increasing the feed consumption. This feed consumption is associated with improved appetite as a result of palatability. Besides, increased feed consumption, which in turn brings about superior general appearance of the pigs, the animals increase in daily gains accompanied by an increase in efficiency of feed utilization.

(3) *Antibiotics alter the microflora of the gut.*—The actual process involved in altering microflora either partially or completely is not clearly explained. But from the results obtained it is presumed that antibiotics bring about the change(s) in the activity of certain bacteria in such a way that is favourable to the host. This change can be possible in one of four ways.

- (a) Antibiotics inhibit the growth of the toxin producing organisms. When toxins liberated by such organisms are at the minimum or in harmless quantities, the animals get the opportunity to utilize their food in better ways.
- (b) Antibiotics possibly inhibit the growth of bacteria that compete with the host for certain essential food nutrients—vitamins. When the competition is less the animal takes advantage of most of the available essential food materials, if not all, for their biological performances.
- (c) Antibiotics favour the development of bacteria. It is suggested that antibiotics may favour the development of bacteria which synthesize nutrients, especially vitamins—B, which are required by the animals. Stockstad (1950) stated that the undesirable bacterial forms which compete with the animal for certain nutrient factor(s) may be eliminated or the suppression of certain micro-organisms may permit others to flourish which are beneficial to the host, by the treatment of antibiotics.
- (d) Antibiotics may kill the micro-organisms and make available the accessory factors to the host. Powick *et al.* (1951) postulated that accessory factor(s) contained in the live organisms in the intestinal tract are, in general, not available to the host; whereas those in dead organisms become so. Aureomycin, by killing certain types of intestinal bacteria could render their accessory factor(s) available to the host. Synergistic action of antibiotics with various feeds is possible.

Use of Antibiotics Against Diseases in Swine

Hutchings *et al.*, (1950) conducted experiments with the treatment of *Brucella suis* infected pigs with streptomycin and sulphadiazine. Two groups were experimentally infected with brucella, while a third group was naturally infected, as determined by serum agglutination reactions. In all cases where blood culture was positive before treatment the bacteraemia ceased following initiation of treatment, whereas in the controls, the bacteraemia persisted for varying lengths of time. Cameron (1951) used an aureomycin fermentation residue on a group of pigs experimentally infected with *Br. suis*. Similarly infected pigs were used as controls. After 28 days of treatment all the treated and untreated were autopsied. Only one of the treated groups was infected at autopsy. He suggested that aureomycin might have bactericidal property against *Br. suis* in vivo. Powick *et al.* (1951) observed that feeding of a broth culture of *Salmonella choleraesuis* at the end of the sixth week of the experiment produced little effect on any of the pigs. Boley *et al.* (1951) used bacitracin in outbreak of swine dysentery in the University of Illinois herd. Treatment of affected pigs was 100,000 units of bacitracin for six days resulted in the recovery of 96% of the pigs. Becker *et al.*, (1951b) reported that aureomycin was a curative for the pneumonic condition in pigs.

Mode of Action of Antibiotics in the Control of Swine Diseases

The mode of action of antibiotics in various swine diseases is not fully understood, but it can be said beyond doubt, that certain antibiotics have either bacteriostatic, or bactericidal or both properties. In addition, some antibiotics are effective only against grampositive organisms while others against gramnegative organisms and others against both. But the efficacy as to how they bring about a cure in affected animals is purely derived from the knowledge gained from medical science. Crawford (1950) stated that advantages from aureomycin in the treatment of diseases are; ready absorption, slow excretion, lack of cumulative ill-effects, ready diffusion in therapeutic amounts into cerebral spinal fluid, penetration into hepatic, renal, splenic and pulmonary tissues, and availability in foetal circulation. The British Veterinary Codex (1953) states that penicillin is bacteriostatic and, in sufficient concentration bactericidal. Its mode of action is not fully understood; it is possible that penicillin interferes with amino-acid metabolism, preventing the passage of glutamic acid across the cell wall. Penicillin does not act upon resting bacteria; bacterial cells dividing in the presence of effective amounts of penicillin, swell, assume abnormal morphological forms and cease to multiply. If the concentration of antibiotic is sufficient, the bacteria are destroyed. Penicillin is said to

be active in the presence of serum, pus and products of tissue autolysis. The same codex (1953) points out that streptomycin is bacteriostatic or bactericidal, depending on the organism, on the concentration used, on the pH and on the nature of medium. Its activity is greatest in a moderately alkaline medium and is reduced in the presence of mineral salts and of blood or other tissue fluids.

Quantity of Administration and cost of Antibiotics in swine feed.

How much of an antibiotic should be fed for maximum response? The answer to this question is not clear at present. However, Beeson (1951) stated that 5 mg. of antibiotic per pound of total finished feed (10 gm., approximately 1/3 oz. per ton) would give maximum response in most cases. When hogs were fed free choice on shelled corn and a protein supplement, the antibiotic should be added to the supplement at the rate 25-35 mg. per pound or 50-70 gm. per ton. Carpenter (1950) stated that the level of aureomycin was 1.25 gm. per 100 pounds of feed in his experiment.

Results indicate that antibiotics have no carryover effect and must be kept in swine ration during the entire fattening period for maximum growth response. Antibiotics can be fed from the time the pigs start eating or from birth to the market weight. For nutritional purpose, as a rule they are added in feed, but for disease control are administered parenterally. What is the cost of antibiotic? The cost varies, depending on the type used, but in general antibiotics cost about 22-25 cents per gram. Assuming that 10 gm. per ton of finished feed is required, the cost would total \$ 2.20 to \$ 2.50 or less than a £ per ton finished feed.

Advantages of Antibiotics

1. Increase rate of growth—about 10—30%.
2. Hogs reach market weight sooner.
3. Improvement in feed efficiency—about 10%.
4. Tend to make all hogs grow at the same rate.
5. Eliminate most of the "runts" and poor feeders.
6. Increase the bloom and thrift of the pigs.
7. Usually cost less per unit of gain.
8. Help in preventing the occurrence of scour.
9. Useful in the treatment of certain swine diseases.
10. Decrease the methionine requirement of the pigs.
11. Increase the appetite.
12. Provide smoother hair coat.
13. Maintain the normal consistency of faeces.
14. Decrease the amount of protein needed in the ration.

Disadvantages of Antibiotics.

Bowland *et al.* (1951) stated that there appeared to be a reduction in carcass quality of bacon-type-hogs receiving a ration supplemented with APF containing aureomycin. Luecke *et al.* (1951) indicated that antibiotic, neuomycin fed at levels 10 mg. per pound of feed had a deleterious effect on growth. The pigs showed depressed gain in feed consumption, but, however, the efficiency with which the animals converted feed to body weight gain was good. They attributed that neuomycin might have altered the microflora in an unfavourable manner. For nutritional purposes the antibiotic must be fed with rations. Becker *et al.* (1951 b) failed to influence the rate of gain of pigs by an intramuscular injection of an aqueous suspension of procaine penicillin at the rate of 200,000 units on alternate days, but were successful in influencing the rate of gain by giving the same substance at the same dosage in seasomeoil containing 2% (W/V) aluminum stearate. Even the above may be as effective as oral in giving antibiotics in rations, the procedure is laborious and time consuming. The factor(s) of safety by the additive effects of a dietary level of various antibiotics has not yet been determined. Brown *et al.* (1950) stated the rapid loss of antibiotic activity in the high moisture content of mixed feeds.

The carry-over effect of antibiotics has not yet been known. If at all, it is very little, not of much significance. The elaborate use of antibiotics both in nutrition and disease control might lead to resistant strains of microflora in the animal system.

Indiscriminate use of antibiotic residues as has been pointed out by Luecke *et al.* (1951) should be avoided. It was experimentally confirmed by the workers at the University of Illinois (Terrill, 1951 a) that though 3-nitro-4-hydroxyphenol arsonic acid in the ration gave a significant growth response over the basal ration, but when it was added at the rate of 0.00375% to the feed containing aureomycin at 5 mg. per pound of ration harmful effects were evidenced.

Conclusion

Use of antibiotic in swine enterprise is based on administration (i.e. the purpose(s) for which it is aimed at) which, in turn, requires a great deal of intelligence and skill. But when the basic requirement of antibiotic for swine nutrition is satisfactorily met, the response of growth is rapid and rewarding. Market quality is improved, income to the swine feeders is secured and satisfaction in business is achieved.

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SELECTIVE BREED PATHOGENICITY OF THE RANIKHET DISEASE VIRUS-VACCINE—A PRELIMINARY REPORT

By

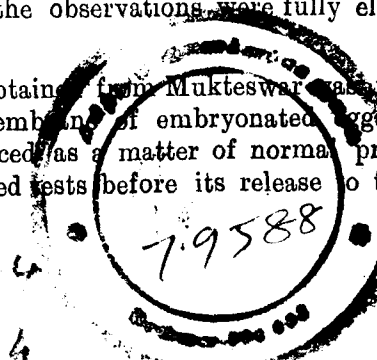
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Ranikhet disease virus vaccine is manufactured in the Bengal Veterinary College from one of the strains of virus maintained in the Indian Veterinary Research Institute, Mukteswar, for the use of the State. Since starting the manufacture of the said vaccine in Bengal Veterinary College in 1951, the observations on the use of this vaccine (as to its immunological properties) were found quite satisfactory and no deviations were observed as to its potency, immunological value, and its applicability on imported and country breeds of poultry. Reaction induced on inoculation of this locally manufactured vaccine caused negligible percentage of loss of life and invalidated few only of the vaccinated birds. Vaccination results were almost similar irrespective of seasonal variations. But a brew of vaccine manufactured in February, '54 exhibited a deviation from normal, though it possessed a satisfactory immunological property and was free from all pathogenic contaminations, yet it was found unsafe causing high mortality amongst vaccinated birds especially in the white-leg-horn breed, which reached a peak of 56% in an experimental observation. The mortality percentage amongst the R.I.R. birds were on the contrary, within normal percentage limits. The factors of infestation of Helminth and Coccidia which might influence the observations were fully eliminated from the experiment.

The strain of seed virus obtained from Mukteswar was passaged through the chorio-allantoic membrane of embryonated eggs for 10 passages, and the vaccine produced as a matter of normal procedure, with due regards to its prescribed tests before its release to the field

5L
KZ m2, N24
N35-31-4



use. The vaccine manufactured at the 11th passage, similarly when passed for use had to be retracted on an unfavourable report as to its use in the field. This sudden deviation towards increased pathogenicity, particularly for W.L.H. chicks was a riddle for the manufacturing laboratory, particularly with regard to the circumstances under which such erratic activity of this vaccine could develop and which was not observed during tests before its release.

Investigation revealed two main points:—

(1) That the stock of vaccine was tested on cross-bred chicks, and white-leg-horn embryos, and not on pure W.L.H. or R.I.R. chicks.

(2) That in the process of manufacture only white-leg-horn embryonated eggs were used not only for this particular passage, but also in the previous ten passages successively.

As a matter of fact a further tests for its purity and safety to testify the previous tests were undertaken with pure breeds of R.I.R. and W.L.H. chicks. The purity of the vaccine, no doubt, was confirmed, but the safety test exhibited an exaggerated mortality percentage particularly with W.L.H. chicks rather than R.I.R. and this observation brought about another confusion as to the safe use of the vaccine in question.

Simultaneous tests of the same stuff undertaken by the Indian Veterinary Research Institute, Mukteswar, furnished a similar view of unsafety to use the vaccine, though it proved clean of any pathogenic micro-organismal contamination, and potent with high immunological property; but the causation of this peculiar erratic activity of this vaccine remained un-commented.

Subsequently at an earliest possible opportunity, an elaborate experiment was arranged for, primarily with a view to determine the influence of helminthic and coccidia infestations on the use of this stock of vaccine. Pure bred W.L.H. and R.I.R. chicks, 25 of each, of about 10 weeks of age, were selected as subjects for vaccination. Of these birds *i.e.*, 12 R.I.R. and 12 W.L.H. birds were treated for to eliminate the infestation of worms and coccidia by Phenothiazine, Cestersol and Sulphamezathine.

The flock consisting of 24 dewormed and coccidia-eliminated chicks (12 R.I.R. and 12 W.L.H.) were taken in one group, and the other group of 26 chicks consisting of (13 R.I.R. and 13 W.L.H.) made up the non-eliminated group, and both the groups were vaccinated with this stock of vaccine. The appended reaction chart will furnish the details.

Findings of this experiment apparently revealed that the casualty and reaction of the vaccine was approximately the same in both the groups whether dewormed or not, which brought about a finding that the reaction of the vaccine was little influenced by either helminthiasis or coccidiosis when infestation was not too heavy, and this happens to be the primary view of the experiment.

A second finding infiltrated from the experiment that the mortality and invalidity percentage reached a peak of 56% and 12% amongst the vaccinated W.L.H. chicks, whereas the death percentage amongst the R.I.R. chicks was only 4% with practically no severe post-vaccination sequelae of nervous symptoms.

Observations

The property of selective breed-pathogenicity of Ranikhet Disease Virus Vaccine obviously developed during the process of cultivation exclusively on the embryonated eggs of White Leg Horn breed in consecutive eleven passages during a period of six months.

2. This vaccine brought about 56% death in 25 W.L.H. chicks and 4% death in 25 R.I.R. chicks in the experiment with 12% and nil % of permanent nervous sequelae respectively in W.L.H. and R.I.R. chicks.

3. Eggs of susceptible breeds of poultry when used for repeated passage of the virus, may increase the pathogenicity while retaining the immunological properties intact.

4. Successive eleven passages of the vaccine virus through the eggs of an obviously susceptible breed failed to maintain the degree of attenuation of the seed virus in its original state and this view is quite in accordance with the idea that repeated and successive passages through the eggs of an obviously resistant breed often attenuates the virus to such an extent that it tends to lose its antigenic properties.

Summary

An observation has been made, and corroborated by experiment on the selective increase of pathogenicity of R. D. virus vaccine towards W.L.H. chicks mainly by repeated and successive eleven passages through the chorioallantoic membrane of W.L.H. embryos. If further experiments confirm it, then it will mean that R. D. virus vaccine will only be able to maintain a standard of attenuation and hence standard properties by being passaged through the eggs of some ideal breed of poultry, which are neither too susceptible, nor too resistant towards the virus.

Successive passages through the eggs of an obviously susceptible breed like W.L.H. may be the cause of erratic activities observed here and in many other circumstances by F.A.O. Expert G. D. Alton.

R. I. R. Birds.

Bird No.	Date of Inoculation and General condition of birds.	Vaccine used	1st day reactions observed after 24 hours.	2nd day 48 hours	3rd day 72 hours	4th day	5th day	6th day	7th day	Remarks
217	6-5-54/Healthy	R. D. Vaccine B. V. C. Strain	—	—	—	Off feed, drowsiness & lameness	Same as before	Same as before	Same as before	Recovered on 16-5-54
215	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 16-5-54
193	Do.	Do.	—	—	—	Off feed, drowsiness & thirst	Do.	Do.	Do.	Recovered on 15-5-54
190	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 16-5-54
225	Do.	Do.	—	—	—	Off feed, drowsiness & lameness	Do.	Do.	Do.	Recovered on 16-5-54
224	Do.	Do.	—	—	—	Off feed, leg weakness & drowsiness	Do.	Do.	Do.	Recovered on 15-5-54 but there is slight lameness.
227	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 16-5-54
214	Do.	Do.	—	—	—	Off feed, drowsiness & thirst	Do.	Do.	Do.	Recovered on 15-5-54
179	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 15-5-54
208	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 14-5-54
216	Do.	Do.	—	—	—	Off feed, drowsiness & leg weakness	Do.	Do.	Do.	Recovered on 16-5-54
218	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 15-5-54
182	Do.	Do.	—	—	—	Off feed, drowsiness & thirst	Do.	Do.	Do.	Recovered on 15-5-54

Deformed R.I.R. Birds.

Bird No.	Date of Inoculation and General condition of birds.	Vaccine used	1st day reactions observed after 24 hours.	2nd day 48 hours	3rd day 72 hours	4th day	5th day	6th day	7th day	Remarks
181	6-5-54/Healthy	R. D. Vaccine B. V. C. Strain	—	—	—	Off feed, drowsiness & thirst	Same as before	Same as before	Same as before	Recovered on 14-5-54
189	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 15-5-54
226	Do.	Do.	—	—	—	Off feed, leg weakness & nervous sympt.	Symptoms same as on previous day	Prostration	Died on 14-5-54	
205	Do.	Do.	—	—	—	Off feed, drowsiness & thirst	Same as before	Same as before	Same as before	Recovered on 14-5-54
204	Do.	Do.	—	—	—	Off feed, leg weakness & drowsiness	Do.	Do.	Do.	Recovered on 16-5-54 but there is lameness.
228	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 16-5-54
192	Do.	Do.	—	—	—	Off feed, leg weakness & nervous sympt.	Do.	Do.	Do.	Recovered on 16-5-54 but there is paralysis of the joints
207	Do.	Do.	—	—	—	Off feed, leg weakness & drowsiness	Do.	Do.	Do.	Recovered on 15-5-54
191	Do.	Do.	—	—	—	Off feed, leg weakness & Nervous sympt.	Do.	Do.	Do.	Recovered on 16-5-54 but there is slight lameness
206	Do.	Do.	—	—	—	Off feed, drowsiness & thirst	Do.	Do.	Do.	Recovered on 15-5-54
183	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 15-5-54
X1	Do.	Do.	—	—	—	Off feed, leg weakness & drowsiness	Do.	Do.	Do.	Recovered on 16-5-54 but there is slight lameness.

W. L. H. Birds.

Bird No.	Date of inoculation and general condition of birds.	Vaccine used and reactions observed after 24 hours.	1st day 48 hours	2nd day 72 hours	3rd day	4th day	5th day	6th day	7th day	Remarks.
200	6-5-54/Healthy	R. D. Vaccine B.V.C. strain	—	—	—	Off feed, drowsiness, thirst and nervous sympt.	Same as before	Same as before	Same as before	Recovered on 16-5-54 but there is lameness permanently
203	Do.	Do.	—	—	—	Off feed, drowsiness and thirst	Do.	Do.	Do.	Recovered on 15-5-54
223	Do.	Do.	—	—	—	Off feed, drowsiness and nervous symptoms	Do.	Do.	Do.	Recovered on 16-5-54
222	Do.	Do.	—	—	—	Off feed, nervous sympt. leg weakness and thirst	Do.	Do.	Prostration	Developed lameness permanently
213	Do.	Do.	—	—	—	Off feed, prostration, nervous symptoms, leg weakness and greenish white loose stool	Same condition as noted in the previous day & prostration	Prostration	Prostration	Died on 11-5-54 at 2-30 p.m.
188	Do.	Do.	—	—	—	Do.	Do.	Symptoms noted in the previous days and in prostration	Same as on previous day	Died on 13-5-54

219	Do.	Do.	—	—	—	Off feed, leg paralysis and nervous sympt.	Do.	Do.	Do. and prostration	Died on 14-5-54
199	Do.	Do.	—	—	—	Off feed, leg weakness and nervous symptoms	Do.	Do.	Do.	Died on 13-5-54
X1 W.L.H. Cock	Do.	Do.	—	—	—	Off feed, leg paralysis and nervous sympt.	Do.	Do.	Do.	Died on 13-5-54
X2	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Died on 13-5-54
X3	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Died on 13-5-54
X4	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Died on 13-5-54
X5	Do.	Do.	—	—	—	Off feed, drowsiness and thirst	Same as before	Same as before	Same as before	Recovered on 15-5-54

Deformed W.L.H. Birds.

Bird No.	Date of inoculation and general condition of birds.	Vaccine used	1st day reactions observed after 24 hours.	2nd day 48 hours	3rd day 72 hours	4th day	5th day	6th day	7th day	Remarks.
197	6-5-54/Healthy	R. D. Vaccine B.V.C. Strain	—	—	—	Off feed drowsiness & thirst	Same as before	Same as before	Same as before	Recovered on 16-5-54
187	Do.	Do.	—	—	—	Off feed, leg weakness & nervous sympt.	Do.	Do.	Slight improvement noticed, 16-5-54 Took very little food	reacted & recovered on 16-5-54
198	Do.	Do.	—	—	—	Off feed drowsiness & thirst	Do.	Do.	Same as before	Recovered on 15-5-54
184	Do.	Do.	—	—	—	Off feed, leg weakness & nervous sympt.	Symptoms prostration as on previous day along with other symptoms as along with toms as prostration noted on previous day	Prostration	Prostration	Died on 14-5-54
212	Do.	Do.	—	—	—	Off feed, leg paralysis, nervous symptoms	Do.	Do.	Do.	Died on 12-5-54 at 4-30 p.m.
209	Do.	Do.	—	—	—	Off feed, leg paralysis nervous symptoms	Do.	Symptoms noted in the previous days and prostration	Same as before	Died on 16-5-54

220	Do.	Do.	—	—	—	Off feed, leg weakness and nervous symptoms	Do.	Do.	Do.	Died on 20-5-54
221	Do.	Do.	—	—	—	Off feed, drowsiness & thirst	Same as before	Same as before	Same as before	Recovered on 14-5-54
195	Do.	Do.	—	—	—	Off feed, leg weakness, prostrations nervous symptoms, greenish white stool	Do.	Do.	Do.	Died on 13-5-54
210	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Died on 13-5-54
196	Do.	Do.	—	—	—	Do.	Do.	Do.	Do.	Recovered on 16-5-54 but there is a little lameness.
194	Do.	Do.	—	—	—	Off feed drowsiness & thirst	Do.	Do.	Do.	Recovered on 14-5-54

**THE COMPOSITION AND NUTRITIVE VALUE OF
TOBACCO (*NICOTIANA TABACUM*. L.)
SEED CAKE OR MEAL.**

By

V. MAHADEVAN, M.A., D.Sc., F.R.I.C.,
Professor of Animal Nutrition, Madras Veterinary College.

(Received for publication on 28-12-54)

The tobacco plant occupies the prime position among the commercial crops cultivated in the world. India, China and the United States are outstanding in quantity of tobacco grown, each producing a billion pounds or more per year when the normal world production is only about 6½ billion pounds. [3].

A tobacco plant can yield more than 80 grams of seeds containing about one million individual seeds, though in practice the average yield is about 20 grams. Tobacco seed has long been used as a source of oil in times of scarcity or famine. But commercial milling for the production of oil and oil cake or meal, has not been developed partly because of the low yield of seed per unit area of tobacco, which is about 1500 pounds per acre and partly because of the relatively low oil content of 32 to 38 per cent, as compared with oil seeds in general. The seeds are non toxic unlike the other parts of the plant which contain the alkaloid Nicotine. The oil contained in the seed is a typical semi-drying oil, 60-75 per cent of which is linoleic acid, 25 per cent oleic acid and a smaller amount of palmitic and stearic acid. [7, 8]. The protein of the seed has been reported to be of exceptionally high biological value for animals. [5]. The surplus seeds over the requirement for cultivation, may be made use of, for making oil and oil cake or meal, which can be fed to livestock.

A sample of tobacco seed cake made in Guntur, has been analysed for its chemical composition, which is given in the Table I. [1].

TABLE I
Composition of Tobacco seed cake, (Guntur).

Nutrients.	Per cent.
Moisture	7.07
Crude Protein	31.50
Ether Extractives	12.29
Crude Fibre	21.50
N. F. E.	17.71
T. Ash.	9.93
Silica	4.36
Ca.	0.33
P.	0.87

THE COMPOSITION AND NUTRITIVE VALUE OF TOBACCO

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The analyses of a number of samples of tobacco seed meal made in Italy by other workers are given in Table II for comparison [4].

TABLE II
Composition of Tobacco seed cakes or meals, (Italy).

Nutrients.	Per cent. (Ranges of Values.)
Moisture	8-13
Crude Protein	31-37
Ether Extractives	0.3-3.0
Crude Fibre	13-27
N. F. E.	15-28
T. Ash	7-14

Assuming the digestibility coefficients of the nutrients in the tobacco seed meal reported for sheep in Italy, the nutritive value of Guntur tobacco seed cake analysed, is given in Table III.

TABLE III
Nutritive Value of Tobacco seed cake, (Guntur).

Digestible Nutrients.	Per cent.	T.D.N.
Crude Protein	21.23	
Ether Extractives	12.29	56.43
Crude Fibre	0.65	
N. F. E.	6.90	

Discussion

The chemical composition of the Guntur tobacco seed cake agrees well for all the nutrients except crude fat or ether extractives, with the values reported for several similar specimens of tobacco seed meals in other countries, [4]. The high oil content of this cake as much as 12 per cent, which is completely digestible, increases the feed value of the cake more than that of the foreign seed meals. The Indian cake contains more than 20 per cent digestible crude protein, the most of which has been reported to be present as true protein and has a high biological value. The crude fibre is the least digestible showing the whole of it is indigestible lignin. The N.F.E., too is not highly digestible. The T.D.N. is fairly high to be useful for animal feeding. The palatability, too, has been reported to be good as cattle can be slowly accustomed to eat it along with the usual concentrates fed. About 25 per cent of the concentrate ration can be easily substituted by the tobacco seed cake for feeding livestock. As it has no toxic principle, it can be fed without any ill effect. The chief value of the tobacco seed

cake as livestock feed lies in its highly useful protein, fat and phosphorus content. The tobacco seed cake has been used as feed for cattle, sheep and pigs in other countries, [2, 4, 6].

Summary

1. Tobacco seed cake made in Guntur has the following percentage chemical composition:—Moisture 7.07; C.P., 31.50; E.E., 12.29; C. Fibre 21.50; N.F.E., 17.71; T. Ash 9.93; Silica 4.36; Ca., 0.33; and P., 0.87.
2. The local cake has a higher fat content than the tobacco seed meals made in foreign countries and therefore it increases its feed value considerably.
3. Assuming the digestibility coefficients of nutrients reported by the Italian workers, the T.D.N. of the Guntur cake is calculated to be about 56.
4. The tobacco seed cake or meal is non toxic for animals.
5. It has a high feed value, containing more than 20 per cent digestible protein of high biological value, highly digestible unsaturated fat and higher amount of Phosphorus than Calcium.
6. The tobacco seed cake or meal is used for feeding cattle, sheep and pigs.

Acknowledgment

Grateful acknowledgement is made to the Principal, Madras Veterinary College for the facilities afforded and to Sri K. Satyanarayana Rao, for technical assistance rendered.

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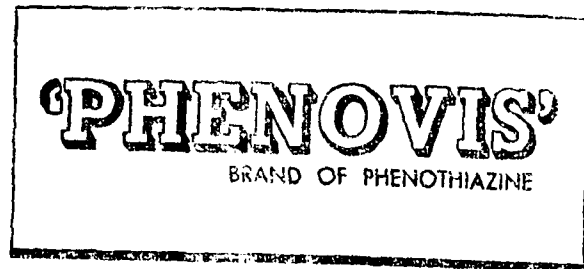
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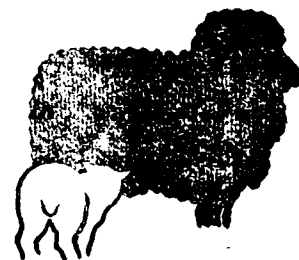
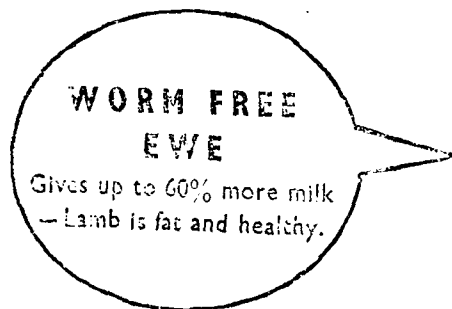
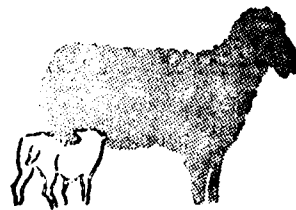
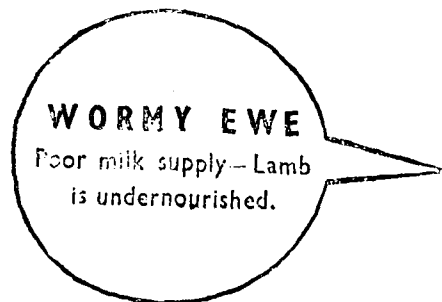
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(The Journal of the All-India Veterinary Association)

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No. 4

Editorial

THE INDIAN COUNCIL OF AGRICULTURAL
RESEARCH

In the field of human endeavour for betterment of the common man in this country, there is not a greater institution than the I.C.A.R., which celebrated its Silver Jubilee in December 1954. These four letters have now become a by-word in rural India for aid and advancement in agricultural matters. That in itself is a great achievement for any organisation, within its first span of 25 years. It owes its existence to a glorious idea given expression to by Lord Linlithgow's Commission on Agriculture. It has worked so well that Sir Frank Ware, Retired Animal Husbandry Commissioner, Government of India, writes in a special article on the Jubilee occasion "The pity of it is that this (the wisdom of setting up such an organisation) is not more widely known in other countries trying to improve their livestock, for if they know of it they would surely be tempted to follow India's good example". That is indeed a great compliment, coming as it does from an eminent Livestock Expert, known for his sobriety of views and restraint.

Started as a Central Body for co-ordinating work in several States so as to avoid duplication and wastage of efforts, it soon found that it had too many irons in the fire and that certain amount of decentralisation was necessary and it has accordingly established a net work of Specialist Committees, such as the Cotton Committee, the Jute Committee, the Coconut

Committee, the Sugarcane Committee, the Arecanut Committee, the Rinderpest Committee, etc. The progress made by these Committees may not be spectacular but their work is sound and they are definitely building for the future.

A stage has now been reached when the I.C.A.R. has found it necessary to take up the work of Agricultural extension, Agricultural information and Agricultural education also. The training of village-level workers, both men and women, is in full swing. To remove the shortage of trained Veterinarians, we are told that they have arranged for "The *ad hoc* training of over a hundred Veterinary graduates by double shifts in two existing Colleges". Why it should not be done in the other Colleges as well, we are not able to understand. We certainly do not approve of turning out half-baked Veterinary Surgeons in our land or men with lesser qualification lest it should lead to quackery and complicate matters at a later date. The Veterinary profession has been hard put to build up their fine reputation in this country, through years of sound scientific work. Let it not now be undone in the name of expediency, urgency and all the rest of it. It might end in incalculable harm. 'Look before you leap' is as wise a maxim as any other and we hope such a responsible body as the I.C.A.R. is fully seized of the importance of this question. There is a separate Publicity Officer who makes use of all modern devices for the education of the illiterates "through stories designed for them". Picture stories in flip books or posters, flannel graph, flash cards, film strips, leaflets and newspapers in simple language are all found in his armoury. It is a thought provoking statement when he says "It seems that the biggest problem is still one of under-estimating the villager". Quite so. This is a fatal mistake which some of the Scientists in general have been committing in their approach to various problems of rural India. Equally precious is the statement by Mr. J. V. A. Nehemiah, Secretary of the I.C.A.R., when he says "What the country needs today is dissemination of agricultural information and not publicity" as is often done.

Several schemes are under way on Animal Husbandry matters as well and in the field of Agricultural statistics based on

sampling technique, it is claimed "More striking advances have been made in India during the past decade than perhaps in any other country".

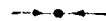
It is indeed a fine record for a 25 year old institution. All honour to I.C.A.R.!

Dr. S. S. BHATNAGAR PASSES AWAY

The new year has opened with the distressing news of the death of Dr. S. S. Bhatnagar, Secretary of the Ministry of Natural Resources and Scientific Research, Government of India. He died of heart attack on the night of 1st January 1955.

One of the most eminent of Scientists this land has produced, he was a dynamic personality of very rare abilities, who refused to believe in slowness of action. He was energy personified and was moving about the country, planning for prosperity through science. Within this short period of seven years of Independence, he was mainly responsible for opening 15 National Laboratories spread all over the country for scientific research. This will be remembered as legacies left behind by this giant of the scientific world. He was a person of very pleasing manners, who was quite at home, whether at Karaikudi in the south or at Delhi in the north. It is a terrible loss which India has sustained. She can ill-afford to lose such men at the present moment. We mourn the loss of this great son of India with the rest of our country men and women and we offer our heart-felt condolences to the members of the bereaved family.

THE TWELFTH ALL-INDIA VETERINARY CONFERENCE



As already announced in the *Indian Veterinary Journal*, a Joint Session of the Twelfth All-India Veterinary Conference and the Madras Provincial Veterinary Conference will be held on the 18th and 19th January 1955 at the Madras Veterinary College, Vepery, Madras under the Presidentship of :—

Major S. DATTA, D.Sc., M.R.C.V.S., D.T.V.M., F.R.S., (Edin.) F.N.I.

Director of Veterinary Services and Animal Husbandry,
West Bengal, Calcutta.

The Hon'ble Dr. Panjabrao Deshmukh, Central Minister for Agriculture, New Delhi, has kindly consented to inaugurate the Conference.

As this session is held in conjunction with the Golden Jubilee Celebrations of the Madras Veterinary College which is to be inaugurated by Pandit Jawaharlal Nehru at 9 A.M., on 17-1-55, members of the profession are particularly requested to make it convenient to attend both the functions and make them a grand success.

The fee for the membership of the Reception Committee of the Conference is Rs. 7/- and that for the ordinary delegate is Rs. 5/-. Remittances may please be made direct to the Conference Treasurer, Madras Veterinary College, Madras-7. Boarding arrangements will be made at extra cost on request to the Conference Secretary, Madras Veterinary College, Madras-7.

Accommodation is made available at the College Hostel for about 100 delegates. Special arrangements, if any, required by the delegates, in near by hotels will also be made on previous intimation. Due to the Indian National Congress meeting close to Madras almost at the same time, there is bound to be a heavy rush on hotels. Members are therefore requested to write to the Conference Secretary sufficiently in advance and get their accommodation reserved.

Volunteers with distinguishing badge will meet the Delegates arriving by all important trains from 16-1-55 onwards; but previous intimation will be very helpful. The President of the Conference is arriving on 16-1-55. The proceedings will commence on each day at

9 A.M. Detailed programme of each day will be made available to the Delegates on arrival.

Resolutions and professional papers, if any, should reach the Conference Secretary on or before 15-1-55.

T. Vinayaka Mudaliar,

General Secretary,

The All-India Veterinary Association.

5-B, St. John's Road, }
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Notes and News

One of the recent welcome innovations of the I.C.A.R. is its 'News Releases' on popular subjects for the consumption of rural India. With the hope that some of our readers may be able to pass on such information to the people in villages, we propose publishing them in future, as space permits. We give below a few of the first releases.

* * * *

Ducks as disease controllers: Check infection of internal parasites.—The rearing of ducks on farms, apart from bringing an additional income to farmers also has proved to be one way of reducing the incidence of internal parasites of domestic animals.

Ducks have been found to eliminate snails from water sources and other places on the farm. These snails are carriers of internal parasites like flukes, liver flukes, and blood flukes which attack farm animals.

Observations made at the Helminthological Research Centre in Madras showed that when ducks were reared, the snail population went down. Hitherto removal by hand and application of chemicals were the only two ways for destroying the snails.—I.C.A.R.

* * * *

Sugar tops make good silage: Excellent green fodder at cheap cost.—Sugarcane tops can be profitably used as silage for feeding cattle. Silage prepared with sugarcane tops and dry leaves together with green oats was found to be an excellent fodder for feeding cattle at the Cattle-cum-Dairy Farm at Karnal.

An analysis of the silage made at the Institute showed that it compared favourably with *jowar* silage from the nutritive point of view, and in fact, in some respects better than *jowar* silage.

Sugarcane tops converted into silage also reduce the cost of green fodder required for dairy cattle. At Karnal, the cost worked out to just about a rupee per maund of the silage.

Silage-making with sugarcane tops thus offers a good opportunity to farmers for profitably utilising the tops which otherwise are a waste.—I.C.A.R.

* * * *

New forage plant shows promise : Kudzu favoured for eroded areas. All those who are seeking a good fodder plant that has an exceptionally good growth-rate, and at the same time can tide over droughty conditions with good grace, cannot do better than give the Kudzu vine a trial.

At the Indian Agricultural Research Institute in New Delhi and other places where Kudzu, called the 'wonder plant' in the United States of America, has been tried, the vine has shown that as an unirrigated crop it stands our conditions marvellously well. It gives out a large number of branches, some of them as long as fifty feet. It forms root at each node, so that each node with its roots can form a separate plant eventually.

Though the vine forms seed in the third year, farmers need not wait for the seed for multiplying the crop. On the other hand, the swollen nodes can be successfully planted.

Apart from being a quick-growing forage crop, Kudzu is also an excellent soil-binder and soil builder. Kudzu is being recommended for growing even in washed and barren lands found in many states and which are normally unfit for profitable utilization.—I.C.A.R.

* * * *

Wheat harvest made easy : Bullock-drawn machine proves popular.—A bullock-drawn disk harrow type thresher, known by the name of Olpad thresher is becoming popular with farmers for threshing wheat.

The machine takes half the time required for threshing wheat by the usual method of bullock threshing. Unlike the traditional method it is not fatiguing to work this machine. It also provides the additional weight required to get a finer type of *bhusa* and helps to crush the nodes of the straw.

The thresher can be pulled over the ordinary threshing floor by a pair of bullocks. The machine, together with a wooden frame, costs Rs. 150.—I.C.A.R.

Association News

MADRAS VETERINARY ASSOCIATION

Joint Session of the Madras and All-India Veterinary Conferences

It has been decided to hold the Joint Session of the 12th All-India and the 11th Madras Veterinary Conferences on the 18th and 19th January 1955 at the Madras Veterinary College during its Golden Jubilee Celebrations. Sri Panjabrao Deshmukh, Central Minister for Agriculture, is inaugurating the Conference. Dr. S. Datta, Director of Veterinary Services and Animal Husbandry, West Bengal, will preside over the session. Sri P. T. Rajan, Chief Steward, Madras Race Club has agreed to unveil the portrait of late Sri R. Swaminatha Ayyar. Sri Bertie A. D'Souza, Principal, Madras Veterinary College, has been elected as Chairman, Reception Committee.

For the Conference, the Reception Committee fee is fixed at Rs. 7/- and that of Delegate fee at Rs. 5/-. The above fee may please be sent to Sri M. Ranganathan, Conference Treasurer, Madras Veterinary College, Madras-7, at the earliest possible date. Delegates are requested to give previous intimation of their arrival so as to enable the volunteers to meet them at the station.

Resolutions for consideration may please be sent so as to reach the Conference Secretary before the 15th January 1955.

Madras Veterinary College, }
Madras-7.
5th January, 1955. }

V. S. ALWAR,
Conference Secretary.

MADRAS VETERINARY ASSOCIATION REGISTRATION OF VETERINARY GRADUATES

I wish to remind the B.V.Sc., degree holders of the Madras University of the appeal to them in last year's September issue of this *Journal* (Vol. 31, ps. 136-137 : 1954) by (Late) Sri R. Swaminatha Ayyar, General Secretary of the All-India Veterinary Association just before his death under tragic circumstances, for getting themselves enrolled as Registered Graduates of the Madras University. That appeal was motivated by his desire to see that our profession is adequately represented in the Senate of the University. But, so far only about 50 out of the total of more than 400 degree holders have got their names registered. May I therefore request the rest to apply for their early registration. The Golden Jubilee of our *Alma mater* is a fitting occasion to fulfil that desire. The requisite forms will be sent by the undersigned on request.

Madras Veterinary College, }
Madras-7.
6th January 1955. }

V. S. ALWAR,

Wednesday the 19th January 1955: Joint Session contd.

9 A.M. Professional Discussion

1. Rinderpest Eradication Scheme.
Speaker: Sri M. R. Mahajan, Secretary, Central Rinderpest Control Committee.
2. Veterinary Education and Research:
Speaker: Sri K. S. Nair, Retired Joint Director of Animal Husbandry, Madras.
3. President's concluding speech.

10-30 A.M. General Body Meeting of the All-India Veterinary Association.

1. President's introductory remarks
2. Presentation of the report of the Association
3. Adoption of the report of the Indian Veterinary Journal
4. Resolutions
5. Election of Office-bearers
6. President's concluding remarks
7. Vote of thanks

2 P.M. General Body Meeting of the Madras Veterinary Association

1. Presidents's introductory speech
 2. Adoption of Managing Committee's report
 3. Resolutions
 4. Election of office-bearers
 5. President's concluding remarks
 6. Vote of thanks
8. P.M. Subscription Dinner.

V. S. ALWAR,
Conference Secretary.

Correspondence

PROPHYLACTIC VALUE OF ANTRYCIDE PRO-SALT
AGAINST TRYPANOSOMA EVANSI

[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.]

Antrycide Pro-salt is known as a valuable chemoprophylactic agent against almost all the pathogenic trypanosomes and the protection is said to last for about 3-6 months. All these trials excepting the one by Ray *et al.* (*Ind. Vet. J.*, 1953, 29. 469) have been made in countries other

THE TWELFTH ALL-INDIA VETERINARY CONFERENCE
AND
THE ELEVENTH MADRAS STATE VETERINARY CONFERENCE

PROGRAMME

Tuesday the 18th January 1955: Joint Session of the Conferences

9 A.M.

1. Arrival of Dr. Panjabrao Deshmukh, Central Minister for Agriculture.
2. Introduction of the Reception Committee members.
3. Photo of the Reception Committee with the Chief Guest.
4. Invocation.
5. Welcome Address by Sri Bertie A. D'Souza, Principal, Madras Veterinary College and Chairman, Reception Committee.
6. Inauguration of the Conference by Dr. Panjabrao Deshmukh.
7. Proposing Dr. S. Datta to preside over the session by Sri V. R. Rajagopalan, Director of Animal Husbandry, Madras.
8. Presidential Address by Dr. S. Datta, Director of Veterinary Services and Animal Husbandry, West Bengal.
9. Unveiling the portrait of (Late) Sri R. Swaminatha Ayyar, by Sri P. T. Rajan, Chief Steward, Madras Race Club.
10. Reading of messages by Sri V. S. Alwar, Conference Secretary.
11. Election of subjects Committee members.
12. Vote of thanks by Sri Rao Sahib T. Vinayaka Mudaliar, General Secretary, All-India Veterinary Association.
13. National Anthem.

8 P.M.

Meeting of the Subjects committee

than India. Ray and his collaborators tested the prophylactic power of this during against *T. evansi* on two cattle only with varying results. Some work was undertaken at the Madras Veterinary College also with this formulation kindly supplied by I.C.I. (India) Ltd. on its efficacy as a prophylactic agent against surra. Though the experiments were confined to guineapigs, rabbits dogs, sheep and goat, the results obtained were interesting and thought provoking.

In all, 6 guineapigs, 6 rabbits, 3 dogs, a sheep and a goat were the subjects of the experiment. Antrycide Pro-salt was injected subcutaneously as an aqueous suspension, the dosage being computed at 5 mg. per pound body weight. Thirty days later all of them were subjected to intraperitoneal injections of 1 c.c. of citrated blood containing bovine strain of *T. evansi* maintained in the laboratory in guineapigs. The infection in the donor was fairly heavy and revealed on wet film examination 8-10 organisms per field under low power of the microscope. Thereafter, the challenge was repeated every 15th day on those test animals which failed to pick up the infection at the previous test. Resistance was noticed in all the guineapigs for the first 30 days. In three it was found to break down by the 45th day, while in the other three by the 60th day. Till 45 days the rabbits resisted the infection. Four of them lost the protection by the 60th day. One got infected when challenged on the 90th day, while in the 6th the resistance was found broken only on the 120th day. All the dogs were immune till 5 months and the sheep and the goat till 4 months.

It will be seen from the above experiments that Antrycide Pro-salt is able to confer protection in guineapigs, rabbits, dogs and sheep and goats for a period of 1-1½, 1½-3½, 5 and 4 months respectively. If this drug can give the same duration of protection in our cattle as has been observed in dogs, sheep and goats, it will become possible to make atleast the valuable stock immune during outbreaks of surra. To this end, we hope that workers in India will come forward with their observations on the usefulness of this product in the control of bovine surra.

Department of Parasitology,
Madras Veterinary College,
Madras-7, 6th Dec. 1954.



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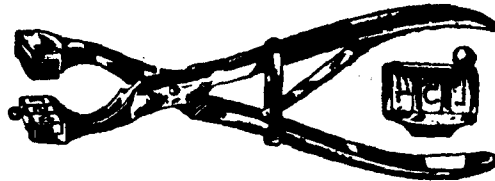
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