

NVRI SEMINAR SERIES

ISSN 1597-1651

A publication of extended abstracts of seminar papers presented by staff and invited guests at the National Veterinary Research Institute, Vom

Edited by

Dr. David Shamaki, Dr (Mrs) Maryam Muhammad and Dr. John U. Molokwu

National Veterinary Research Institute, Vom
P.M.B 1, Vom, Nigeria
Email nvri1924@yahoo.com

TABLE OF CONTENTS

Foreword

Molokwu, J. U.2

Emerging Foodborne Pathogens: A Public Health Challenge in Nigeria

Chukwu, O. O. C, Muhammad J. M, Ogbonna, C. I. C, Ogo, I. N, Ngulukun, S. S, Nwakpa, N. D. and Okewole, P. A.3

Rinderpest Serosurveillance and Clinical Surveillance in Nigeria: 2003 And 2004

Shamaki, D, Luther, N. J, Fashina, F. O, Udeani, T. K. C, Elayo, S. A, and Ahmed, I. G.7

Replacement Value of Rice Bran For Wheat Offal In Quail Chicks Diet in Vom, Plateau State Nigeria

Edache, J. A, Musa, U, Okpala, E, Esilonu, J. O, and Jibrin I. I.11

Effect of Feeding Three Different Commercial Diets on The Growth Performance of Quail

Erakpotobor, P. W, Anche, S. A, Ndam J. and Mustapha, S. L.12

Nutritional Qualities of Mushroom

Ogedegbe, S. A and Makinde, A. A.16

Rational Use of Antibiotics In Veterinary Medicine: A Review

Luther, N. J. and Bott D.18

African Locust Beans as Protein Supplement In The Diet of Broilers: Effect on Growth Rate and Carcass Yield

Erakpotobor, P. W, John, J. D, Ogedegbe, S. A and Mustapha, S. L.21

Developing A Personal Pension Scheme: Opportunities Available in Owning Shares

Ikeobi, N. R.24

General Principles of Diagnosis and Disease Treatment In Traditional Chinese Veterinary Medicine

Kumbish, P. R.27

Theories and Application of Acupuncture and Moxibustion In The Treatment of Livestock Diseases

Kumbish, P. R.30

FOREWORD

One of the most drastic mistakes of the recent past is neglecting development and refinement of the mind, and discouraging the habits of reading, study and research. Research remains the cardinal mandate of the Institute, and efforts to document this activity is the focus of the Seminar Series. The NVRI Seminar Series No.3 is the third in the series and continues to focus on research activities conducted by staff.

For the period under review, Research Staff, particularly those who have benefited from the 'new dawn' of the Institute's Specialty Training Schemes overseas, were invited to present papers on various scientific technologies so acquired. Topics so covered include Acupuncture and Chinese Traditional Veterinary Medicine. In continuation with the trend to endear non research staff to seminar presentations, topics on "Pension Schemes and Capital Market" and "Mushrooms as Food and Medicine" were also covered.

The modern Info-Technology gadgets in use, such as the power point projector continue to enhanced and enriched Seminar Presentations.

Research in NVRI, has continued to be strengthened as is reflected in the quality of 2003 presentations. All aspects of the Institute's activities have continued to receive some attention and this will continue to reflect in the range of presentations that will be made during seminars. Management will continue to focus attention on research in livestock disease control, including *vaccine development, quality assurance of products, livestock production, ethno-veterinary* research and *molecular biology* techniques.

The Institute is committed to research excellence and the continued training of research staff is sine qua non to achieving this objective.

Dr. J. U. Molokwu

Chairman, Seminar Committee

EMERGING FOODBORNE PATHOGENS: A PUBLIC HEALTH CHALLENGE IN NIGERIA

Chukwu O.O.C.*; Muhammad J.M.*; Ogbonna, C. I. C.**; Ogo, I.N. +; Ngulukun, S.S.*; Nwankpa N.D.* and Okewole, P.A*

*Bacterial Research Department National Veterinary Research Institute, Vom.

+ Parasitology Department National Veterinary Research Institute, Vom.

**University of Jos, Department of Botany (Applied Microbiology Research Unit)

E-mail: chyookxs@yahoo.com

SUMMARY

Food quality has continued to be in high demand despite the agricultural and technological advancement to improve its supply and enhance quality of life. Food serves as vehicle for the transmission of disease causing pathogens through intrinsic and extrinsic forms. The intrinsic forms include food Allergens and toxic foods, whereas the extrinsic include Chemicals, parasites and micro organisms which contaminate the food. In the last two decades, the epidemiology of food borne disease is changing. New food borne pathogens have continued to emerge causing millions of illnesses and chronic complications in man and animals. The presence of food poisoning bacteria and bacteria causing various clinical syndromes present an increasing health hazard to humans all over the world. Improved surveillance that combines rapid detection and sub typing methods, cluster identification and collaborative epidemiologic investigation can identify, prevent or control large or dispersed outbreaks.

KEY WORDS: Food borne pathogens, emerging disease, public health, Nigeria

INTRODUCTION

Many food borne pathogens have been recognised in the past. Cases of these traditional pathogens have increased. Also there has been an increase in emerging pathogens such as *Listeria monocytogenes*, *E. coli* 0157:H7, *Campylobacter* species, *Yersinia enterocolitica* and *Salmonella enteritidis*. This increase has been attributed to better reporting systems, changes in Agricultural practices associated with recycling of waste products of human and animal origin e.g. *Salmonella enteritidis*, change in eating habit, change in distribution, storage and marketing and improved diagnostic technique (Schuchat, et al 1991; Baird-Parker, 1994; Tauxe, 1997; Duarte et al 2002; Bailey et al 2003; Islam et al 2004) Some bacteria elaborate their toxins in food before consumption. This occurs when such food is improperly stored for a long period of time making it possible for the bacteria to multiply in such conditions e.g. *Staphylococcus aureus*. Others such as *Salmonella typhi* cause diseases after they are ingested, multiplying in the hosts system and elaborate toxins in the intestine and are carried to vital organs of the host. In this review, we consider the extrinsic causes of new emerging food borne pathogens especially bacteria, in order to expand our knowledge of them, their sources of contamination, mode of transmission, microbiological methods for detection (diagnosis) and possible control measures.

Current Food Borne Pathogens of Public Health Concern

Listeria monocytogenes, *Campylobacter jejuni*, *Campylobacter fetus* spp *fetus*, *Salmonella enteritidis*, *Salmonella typhimurium*, *Clostridium difficile*, *Yersinia enterocolitica*, *E. coli* 0157:H7 and related *E. coli*; 0111: NM and 0104:H21, *Cryptosporidium parvum*, *Cyclospora cayetanensis*, Norwalk-like virus, Hepatitis virus

Sources of Food borne Pathogens

a) Food borne bacteria of animal origin include *Listeria monocytogenes*, *Salmonella* spp, *Campylobacter* spp; *Yersinia enterocolitica* could be derived from poultry meat,

other meat, eggs and dairy products. *E. coli* 0157:H7 and *Brucella spp.*, from raw or rare ground beef and unpasteurized milk.

b) Food borne bacteria of soil origin include *Listeria monocytogenes*; *Clostridium perfringenes* from the soil could contaminate cooked meat, poultry, stew and soup. *Clostridium botulinum* could be found in improperly canned low acid foods (Vegetables, meat, fish, poultry) Smoked fish and cooked refrigerated low acid foods (toxin is broken down by heat).

c) Food borne bacteria of food handlers include *Staphylococcus aureus* and *Salmonella spp.*; proteins containing foods such as meat, poultry, fish, milk and salad made with meat.

d) Food borne bacteria from water include *Listeria monocytogenes*, *Salmonella spp.*, *Vibrio cholerae*, *Clostridium spp.*, *Aeromonas hydrophylia*.

e) Food borne bacteria from fruits and vegetables include *Listeria monocytogenes*, *Salmonella typhi*, and *Staphylococcus aureus*.

f) Food borne viruses originate from human intestine and are shed in the faeces. These viral diseases result from faecal contamination of food directly through mishandling of food by infected persons or indirectly through sewage water contamination e.g. Hepatitis A, Poliovirus and Norwalk virus.

g) Food borne parasites include intestinal worms and protozoan parasites. Intestinal worms include *Trichinella spp.*, round worms in pork and bear meat, *Cysticercus spp.*, beef tape worm, *Anisaka* fish food worm. Protozoan parasites include- *Toxoplasma gondii*, *Giardia (lamblia) intestinalis* and *Cryptosporidium spp.* in water or from animal faeces or food or person-person.

h) Food borne moulds include aflatoxin from peanuts, corn, cotton seed, and groundnuts.

Diagnosis

Classical methods for the detection of bacteria in food involve pre-enrichment, selective enrichment, culturing on a selective medium, followed by biochemical and serological confirmation and differentiation. These methods, however, are laborious and take several days to produce a result. Recently, rapid methods based on immunoassays (ELISA assays) and/or DNA-or RNA probe (PCR) offer faster and specific alternative (Swaninathan and Feng 1994; Roberts 1994).

Control

Hazard analysis on the food product from the farm to the table should be considered. Critical control points; there are steps at which effective control can be applied to prevent, eliminate or reduce the risk of occurrence of hazards in the food chain. These include:

Raw materials

Processing and procedures (formulation)

Processing equipment

Processing parameters and operating procedures

Packaging conditions

Storage of finished products

Distribution conditions

Usage of products

Better understanding of how foods borne disease causing pathogens persist in animal reservoirs is also critical to successful long-term prevention.

One of the most striking ways to effectively deal with the problem from the farm to the consumer is a combined strategy of eliminating the bacteria/virus/parasites/fungal causing diseases in farm animals, their feed, water and the environment. Others are proper

cooking of foods, separation of cooked from raw foods and public health education of consumers.

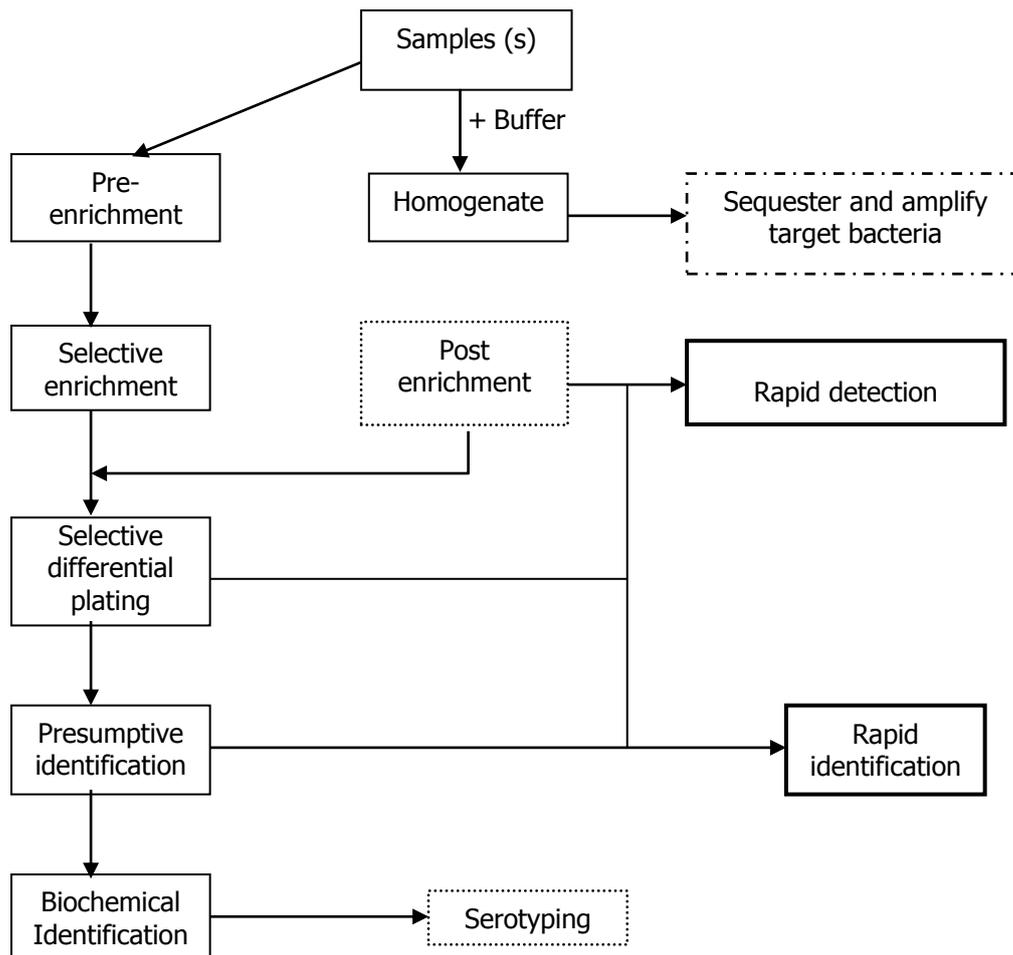


Figure 1: Flow chart showing an algorithm for the isolation and identification of pathogenic bacteria from foods. (Solid boxes) Conventional culture method (dashed boxes) optional step; (Boldface boxes) rapid method; (dashes-dotted box) future method.

Challenges in Nigeria

Knowledge concerning the hazards and the risks associated with microbial contaminants at different critical stages in the food chain (farm to consumer) are not fully applied with the result that control is not concentrated on those critical points of the food chain where risks are highest.

What to report, where and who to report to are also serious challenges.

The availability of testing services, disease reporting system and follow up responsibilities are not well defined.

At laboratory level, the recognition that pathogens need optimization of culture media before detection is a serious challenge. Pathogens can be injured as a result of exposure to sub lethal heating, freezing and exposure to acid environment such that they appear to be absent when cultured.

Therefore, optimization of repair conditions to enhance detection of those pathogens in any given food or consumables are very necessary and must be considered. This is because public health consequences associated with injured pathogens escaping detection and going on to repair in food are very possible.

CONCLUSION

Emerging food borne pathogens are a threat to public health. The overall public health significance of pathogens in foods must be assessed and infective doses defined so that sampling and testing protocols can be designed to measure the relative risk of a community or population through early detection of these pathogens at low level of food contamination. Sampling plans, procedures and optimization for the recovery of the organisms at levels of contamination. Recognition of susceptible individuals of these pathogens within the population and recognition of food that are most likely to be contaminated by these emerging pathogens are also critical. In the near future, control and prevention of food borne disease will largely depend on controlling contamination of feed and water consumed by the animals themselves.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the Director of National Veterinary Research Institute and the staff of Bacteria Research.

REFERENCES

- Bailey, D. G., Vanselow, A. B., Hornitzky, A. M., Hum, I. S., Eamens, J. G., Gill, A. P., Walker, H. K. and Cromin, P. J. (2003). A study of food borne pathogens: *Campylobacter*, *Listeria* and *Yersinia*, in faeces of slaughter-age cattle and sheep in Australia. *Commun. Dis. Intell.* 27:249-257.
- Baird-Parker, C. A (1994). Food and Microbiological risks. *Microbiology* 140:687-695.
- Duarte, L. E, Guorra, M. M. and Bernardo, M. F. (2002). *Salmonella* and *Listeria* spp carriage by gulls (Larids). *Revista Protuguesa de Ciencias Veternarias* 97(544) 181-187.
- Islam, M., Morgan, J., Doyle, P. M., Phatak, C. S., Millner, P. and Jiang, X. (2004). Persistence of *Salmonella enteritica* Serovar *typhimurium* on lettuce and parsley and soils on which they were grown in fields treated with contaminated manure composts or irrigation water. *Food borne pathogens and Disease* Vol. 1 No. 1, 27-35.
- Roberts, P. (1994). An improved cultural/immunoassay for the detection of *Listeria* specie in Food and Environmental samples. *Microbiology Europe* Vol.2 No. 5, 18-21.
- Shuchat, A., Swaminathan, B. and Broome, V. C. (1991). Epidemiology of Human Listeriosis. *Clinical Microbiol. Rev.* Vol.4, No. 2, 169-183
- Swaminathan, B. and Feng, B (1994). Rapid detection of food borne pathogenic Bacteria; *Annu. Rev. Microbiol.*, 48: 404-426.
- Tauxe, V. R. (1997). Emerging food borne pathogens: An evolving public health challenge. *Emerging infectious Dis.* Vol. 3, No. 4, 1-14.

RINDERPEST SEROSURVEILLANCE AND CLINICAL SURVEILLANCE IN NIGERIA: 2003 AND 2004

Shamaki*, D.; Luther*, N. J.; Fasina, F.O.*; Udeani, T.K. C.*; Elayo, S.A.* and Ahmed, I.G. **

*National Veterinary Research Institute, Vom Nigeria,

**National PACE Coordination Office Abuja, Nigeria

INTRODUCTION

The National Council for Agriculture, the highest National policy-making body on agriculture in Nigeria, at its meeting held in Sokoto from 26 to 31 March 1998 approved the recommendation that Nigeria be declared provisionally free from Rinderpest with effect from 1 April 1998 (1). With this declaration, Nigeria stopped the vaccination of cattle and the use of the Rinderpest vaccine for heterologous protection of sheep and goats against pests des petits ruminants (PPR)

Following the cessation of Rinderpest vaccination, Nigeria entered the recommended expanded Office of International Epizootics (OIE) pathway of the Global Rinderpest Eradication Programme (GREP) (2, 3). Nigeria however only joined other African countries in the execution of the PACE Programme from May 2001. The major objectives of the Pan African Control of Epizootics (PACE) project are to improve national capacity and strategy for epidemiosurveillance; early detection of priority diseases and the development of control strategies.

Nigeria has actively tried to create an effective Epidemiosurveillance system since the beginning of the PACE project to prevent the introduction of Trans boundary diseases. In this respect, an active epidemiosurveillance network has been established and operated in the country. The network includes trained surveillance agents located at strategic locations all over the country (Figure 1) and a laboratory network for analysis of suspect samples. The results of this active surveillance activity in the first eight months since the network was activated are presented in Table 1. Nigeria is also an active participant in the current effort to eradicate Rinderpest along the OIE pathway from the West African sub region under the PACE project.

MATERIALS AND METHODS

1. Stratification

The animal husbandry system in Nigeria ranges from the nomadic transhumance cattle rearers, to the semi-settled and a few commercial dairy and mixed farms. In addition there is a large population of sheep and goats. Rinderpest has not been reported in any other species in Nigeria except in cattle. The country has therefore been taken as a single stratum for the sero surveillance activities.

Sero surveillance activities were planned for 2003 and serum samples collected but authorities responsible for livestock health decided that due to serious logistic problems and incorrect sampling procedures any results generated from the exercise could not be relied upon. Authorities therefore decided that the exercise be repeated in 2004. Clinical surveillance was conducted in August/September 2004 with a serological surveillance planned for November 2004.

2. Sampling Unit

A structured clinical surveillance programme for 2004 has been implemented. The sampling units for the 2004 active surveillance activities are based on geographic map coordinates using the map info programme and database Figure.

3. Sample selection

i. Selection of sampling units

646 sampling sites were randomly selected and sampled using map coordinates. Animals located within a 3km radius of the selected points were considered as a unique herd and examined and sampled accordingly.

ii. Selection of eligible animals

As the exercise conducted was strictly a clinical surveillance, all animals seen within the selected areas were considered eligible and thus examined for signs of stomatitis-enteritis. Samples were collected from suspect animals and sent to the laboratory for analysis.

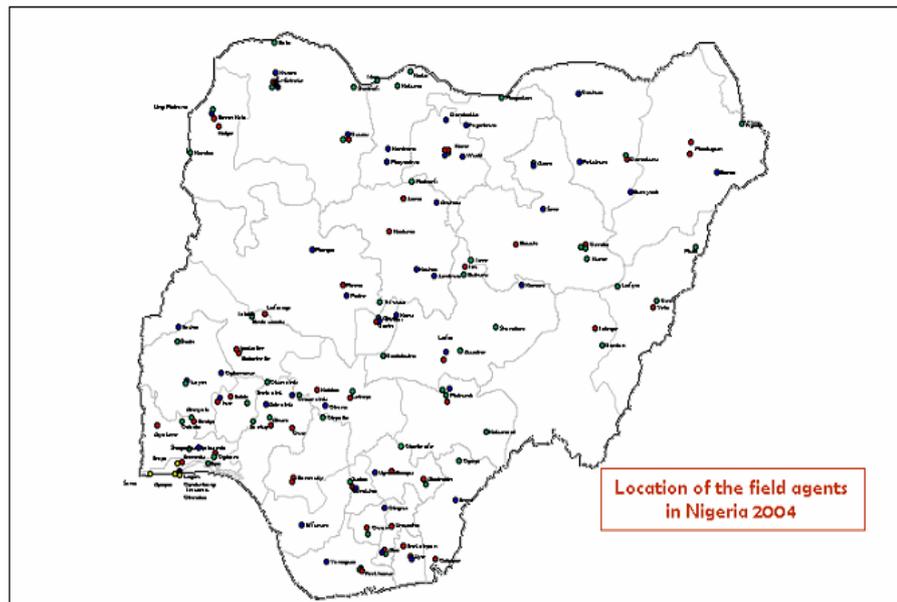
4. Collection of samples

Animals with clinical signs leading to suspicion of Rinderpest were bled using 10ml syringes with 18 gauge-21 gauge needles or using vacutainers depending on which was available. 10ml of blood sample were usually collected and allowed to clot for serum separation. Serum that separated was gently decanted into serum sample bottles and transport in ice to the laboratory. The serum samples are being stored in the laboratory at -200C until tested.

In the case of nasal and ocular discharges swabs were taken and expressed in PBS with antibiotics and stored at -20 °C until tested. Currently active surveillance activities are being undertaken by 158 agents at control posts, livestock markets and abattoirs. The locations of the field agents are presented in Figure II

5. Serological tests

The H protein monoclonal antibody based competitive enzyme immunoassay (C-ELISA) will be used to analyse the serum samples. Positive cases will there after be confirmed using N protein monoclonal based competitive enzyme immunoassay (C-ELISA), the Rinderpest indirect ELISA and finally using serum neutralization test (SNT). Nasal and ocular discharges swabs are tested using counter immuno electrophoresis test (CIE).or agar gel immuno diffusion test (AGID)



6. Statistical analysis of results

The results of the active surveillance from February to August are presented on Table 1. The preliminary results for the clinical surveillance conducted in August/September are being analysed.

QUALITY ASSURANCE

In order to build confidence in the results generated by the laboratory, quality assurance processes have been initiated with a Quality Assurance training for research and production staff of NVRI which was implemented in 2003 by Dr Karim Tounkara an IAEA expert at the AU-IBAR Office Nairobi. The Institute has appointed an Acting Quality Manager for the Laboratory. The production of quality manual has commenced with the compilation of SOPs, personnel bio data and the upgrading of laboratory facilities.

DISCUSSIONS AND CONCLUSION

Following the official declaration of Nigeria provisionally free from Rinderpest in 1998, Nigeria joined the OIE pathway for the global eradication of Rinderpest. The country therefore stopped vaccination immediately. Two years later in 2000 the country was to conduct a serological surveillance but this was not undertaken because Nigeria officially commenced implementation of the PACE project in 2001.

Due to logistical and other associated problems the sero surveillance activities of 2003 were not successful. The country therefore conducted another clinical surveillance in August 2004 so as to provide data that will provide information on the current situation in the country. This was with a view to supporting the country's application to the OIE for rinderpest disease freedom. Another serological surveillance will be conducted in 2005 to maintain progress along the OIE pathway.

Two types of surveillance activities are carried out the passive surveillance which is mainly conducted by States at various clinics, abattoirs, farms etc on a routine basis. Reports generated are sent to the Federal Epidemiology Unit. Active surveillance was structured, continuous and commenced in February 2004. 158 surveillance points are located at strategic points; control posts, abattoirs and cattle markets. Surveillance agents have been trained on disease recognition, sample collection and handling and techniques. Wild life surveillance has not fully taken off although two training programmes and one exercise have been conducted with regional support.

ACKNOWLEDGEMENT

The assistance of Dr. Nick Nwankpa and Dr. Atanda Muraina of Bacterial Research Department, and the Technical staff of Viral Research and Bacterial Research Departments are appreciated. We are also grateful to Mr. Samuel Dimka for secretarial assistance in the preparation of this manuscript.

REFERENCES

1. Anonymous (1999). OIE, Disease Information Bulletin. Vol. 12. No 4.
2. Anonymous (1994) Recommended procedures for disease and serological surveillance as part of the Global Rinderpest Eradication Programme (GREP). IAEA-TECDOC
3. Anonymous (2000). Guidelines for the use of performance indicators in Rinderpest surveillance programme. A part of the Global Rinderpest Eradication Programme, prepared by Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. IAEA-TECDOC-1161.

TABLE 1: Results for Active Surveillance 2004 for Rinderpest and Other Diseases

	Disease	No of Suspicions	No. Positive
1.	Rinderpest	19	-
2.	Contagious Bovine Pleuropneumonia	47	2
3.	Foot and Mouth Disease	25	-
4.	Pestes des Petits Ruminants	30	7
5.	Trypanosomosis	3	-
6.	Haemorrhagic Septicaemia	2	-
7.	African Swine Fever	162	21
8.	Newcastle Disease	23	8
9.	Theliasiasis (Helminthosis)	1	-
10.	Besnoitiosis	1	-
11.	Tuberculosis	1	-
12.	Infectious Bursal Disease	36	13

REPLACEMENT VALUE OF RICE BRAN FOR WHEAT OFFAL IN QUAIL CHICKS DIET IN VOM, PLATEAU STATE NIGERIA.

Edache, J. A., Musa, U., Okpala, E., Esilonu, J.O. And I. I. Jibrin
National Veterinary Research Institute, Vom.

ABSTRACT

A feeding trial covering a six-week was conducted to determine the replacement value of rice bran for Japanese quail chick. It involved 130-day-old quail chicks on deep litter. Four test diets containing graded levels (0, 5, 10, and 15%) of rice bran at the expense of wheat offal were used in the trial. The diets were iso-nitrogenous (25%CP) containing metabolizable energy levels ranging from 2800 to 2900 Kcal/kg M.E. as recommended by Haruna, *et al* (1997). Each dietary level was replicated three times. Feed and water were given ad libitum. Response measured, were feed consumption, weight gain, and feed/gain ratio. Feed consumption(775.78g, 796.64g, 785.41g and 754.56g) and weight gain (155.29, 169.44, 160.64 and 151.87g) were similar ($P>0.05$) for all the treatments. This supports the report of Malynicz (1974) that even at 50% rice bran level feed consumption and weight gain were not depressed. It however disagrees with the findings of Tibon (1979) who recorded depressive effect of rice bran on growth beyond the 10% dietary level. Feed/gain ratio also did not differ significantly ($P>0.05$) among the treatments (5.01, 4.06, 4.80 and 5.72). Feed cost/kg diet was lowest for diet 4 (15%). Results of this study indicated that assuming a dietary crude protein level of 25% and metabolizable energy of 2800 to 2900 kcal/kg feed, a rice bran level of 15% was suitable for acceptable growth performance in Japanese quail chicks in the first 6 weeks of life in Plateau State.

Key words: Rice bran, Quail chicks, Test diet

Effect of Different Rice Bran Levels on Mean Feed Consumption, Weight Gain and Feed Efficiency of Quail Chicks at 6 Weeks of Age

	1	2	3	4	SEM
Feed consumption	775.78	796.64	785.41	754.56	±21.22
Weight gain	155.29	169.44	160.64	151.87	±5.876
Feed/gain ratio	5.01	4.61	4.80	5.72	± 1.05
Feed cost (N)/ kg	41.53	40.78	40.03	39.25	-
Initial weight	8.81	8.34	8.79	9.24	-
Final weight	163.89	177.78	1699.44	161.11	-

REFERENCES

Haruna E.S., Musa. U.; Okewole, P.A.; Shamaki, D.; Lombin, L.H.; Molokwu, J.U.; Edache, J.A. and Karsin, P.D. (1997). Protein Requirements of Quail Chicks in Plateau State, Nigeria. Nig. Vet. J. 18 108-113

Malynicz, G.L. (1974). The value of rice bran in broiler rations. PAPUA New Guinea Agricultural Journal 25(3) ¼ 51-53.

Tibon M.E. (1979) Effect of Feeding Broilers at Different Ages with Various Levels of Cono Rice Bran. Annals of Tropical Research 1 (1) 50 – 55.

EFFECT OF FEEDING THREE DIFFERENT COMMERCIAL DIETS ON THE GROWTH PERFORMANCE OF QUAIL

¹P.W. Erakpotobor, ¹S.A. Anche, ¹J. Ndam and ²S.L. Mustapha

¹FCAHPT, National Veterinary Research Institute, Vom

²National Productivity Centre, Bauchi.

ABSTRACT

A seven-week study was conducted to determine the “Effect of three different Commercial diets on the growth performance of Japanese quail (*Coturnix coturnix japonica*)”. One hundred and sixty newly hatched quail chicks were allotted three treatment groups comprising of 54, 54 and 52 quail chicks each. The birds were further placed in two replicates of 27, 27 and 26 quail per group. The experimental diets consisted of 19, 18, and 16% CP for T1, T2 and T3 based on their proximate composition and sourced from Sanders, ECWA and NVRI feeds respectively for the first five weeks (starter stage). At the finisher stage, the diets comprised of 16, 18 and 17% CP for Sanders, ECWA and NVRI layers mash respectively. Parameters observed included feed intake, water intake, weight gain and age at first lay. The data was subjected to the analysis of variance to measure the level of significance. There was a significant ($P<0.05$) increase in weight gain, feed and water intake amongst the dietary treatments. Quail fed with 19% CP diet had higher ($P<0.05$) values for weight gain, feed and water intake, full feathering and early sexual maturity which manifested in early egg production (88) as against (14) and (6) for the 18 and 16% CP diets respectively at the end of the experimental period. The significantly better ($P<0.05$) performance by birds fed 19% CP in all the parameters observed tend to suggest that 19% CP diet is ideal for the optimum performance of quail birds.

Keywords: Quail, commercial diets, growth performance.

INTRODUCTION

The quail is a small bodied bird belonging to the species *galliformes*, which is a native to Asia and Europe and have been farmed since ancient times. Many of the modern day domesticated strains originated in China and migratory Chinese carried them throughout Asia. Today about 44 species exist and 22 of these have been domesticated. Out of this lot, the Japanese quail (*Coturnix coturnix japonica*) has become the bird of commerce.

The quail is generally known to be resistant to many diseases of the domestic chicken and is easy to keep like the domestic fowl. Due to its hardiness, small size and short life cycle, quail could be used as experimental birds and for the biological production of vaccines, especially Newcastle disease vaccine to which they are resistant (NRC, 1991; NVRI, 1996). With the current economic hardship and gradual decline in the dietary protein intake of the average Nigerian, the quail no doubt becomes an alternative protein source. Also at a time when people are in search of food especially animal protein low in fat and cholesterol, quail meat fits the bill (Barret, 1989; NRC, 1991).

Although information on the nutritional requirements of the tropical African quail is scanty, several workers like Begin and Baldine (1967); Bruce and Latshaw (1981); McNaughtan and Reece, (1982) have suggested a dietary protein level of 28% CP for intensively raised quail. Whyte et al, (2000) suggested a dietary protein level of 18-24% CP for good performance. With the increasing cost of commercial feed, poultry farmers must examine the cost-nutrient efficiency to determine the growth performance of birds in order to maximize profit.

The aim of this study was to determine the growth performance of quail fed with three

different commercial diets and to determine the best available commercial feed suitable for growing quail within the Vom environment.

MATERIALS AND METHODS

One hundred and sixty (160) newly hatched day old quail chicks were procured from the poultry farm of the National Veterinary Research Institute Vom. They were allotted three treatment groups comprising of 54, 54 and 52 chicks each in a randomized block design. Each group of birds was further replicated twice consisting of 27, 27 and 26 birds respectively for each replicate. Three commercial diets labelled A, B, C were used. The diets contained the following ingredients maize, sorghum, maize/sorghum offal, dicalcium phosphate, limestone, salt, premixes and minerals. Antibiotics and vitamin/mineral supplements were provided when necessary. The data collected were for feed intake, weight gain, water intake and age at first lay. The data were analyzed using the analysis of variance method.

The quail birds were intensively managed under the deep litter system and fed ad-libitum. Feeding was done in two phases i.e. chick mash at 0-5 weeks (brooding phase) and layer mash at 6-7 weeks (finishing phase). Water was also given ad-libitum.

RESULTS AND DISCUSSION

The diets were analyzed in the laboratory to determine their proximate composition (Table 1).

Table 1: Proximate composition of treatment diets (Weight per 100g DM)

Sample	Moisture	CP	CF	Fat	Ash	NFE	Ca	P	MEKcal/Kg
Chick Mash									
A	11.03	19.8	10.1	4.7	8.1	57.3	1.9	1.1	350.4
B	10.0	18.1	12.3	7.9	10.4	51.3	1.6	1.7	349.1
C	10.8	16.7	7.6	3.6	14.3	57.8	3.2	1.5	330.3
Layers Mash									
A	9.9	16.1	14.8	3.7	14.5	50.9	1.8	0.4	301.6
B	8.7	18.5	10.0	3.0	15.1	53.4	3.6	0.9	314.7
C	9.6	17.5	10.7	5.5	13.5	51.8	1.8	0.8	326.8

Table 2: Performance characteristics of Quail.

Parameters	Dietary treatments					
	T1	T2	T3	MEAN	SD	SEM
Initial weight (g)	9.25	9.25	9.42	9.30	±0.08	0.05
Final weight (g)	162.94a	143.6b	127.69c	144.7	±14.41	8.32
Wt gain (g)	153.69a	134.4b	118.3c	135.5	±14.47	8.35
Av. weekly wt gain (g/b)	21.96a	19.2a	16.9b	19.4	±2.0	1.16
Av. daily wt. Gain (g/b)	3.12a.	2.74b	2.41c	2.76	±0.29	1.17
Av. daily feed intake (g/b/d)	16.95a	16.29a	12.62b	15.3	±1.93	1.12
Feed efficiency	0.18ab	0.17b	0.19a	0.18	±0.00	0.00
Av. daily water intake (ml)	35.2a	26.62b	23.7c	28.5	±4.88	2.82
Age at first lay(wks)	6a	7b	7b	6.7	±0.47	0.27
Av. egg production	44a	7b	3c	189	±18.46	10.66

Significant ($P < 0.05$): abc Means in the same row bearing different superscripts differ significantly

The values of crude protein were 19.8% CP (T1), 18.1% CP (T2) and 16.7% CP (T3), for feeds A, B and C, used as chick mash during the starter phase of the experiment.

In the finisher phase the diets comprised of 16.1% CP (T1), 18.5% CP (T2) and 17.5 CP (T3), Table 1.

The results obtained showed average weight gains of 153.69, 134.4 and 118.3g for quail in T1, T2 and T3 respectively. T1 (153.69g) recorded a significantly ($P<0.05$) higher value than T2 (134.4g) and T3 (118.3g). Similarly the final live weights ranged between 127.69g – 162.96g (Table 2). Higher weights were recorded in quail fed with 19.8% CP (T1). The average daily weight gains of 3.12, 2.74 and 2.41 followed the same trend and these differed significantly due to dietary treatments. The values give credence to the earlier reports of (Wilson et al, 1959; Cooper 1987; Haruna and Sanyaolu, 1993; Okeke and Oluremi, 2003) and slightly lower than the values of 160-200g reported by NRC (1991). The result of this study agrees with the report of (Whyte et al, 2000) who recorded better optimal performance on quail birds fed 24% CP and 18% CP than those on 12% CP diets.

Average daily feed intake per birds ranged between 12.62-16.85g. This indicated a significantly ($P<0.05$) better feed intake with increased level of crude protein. Feed intake was higher in birds fed 19% CP (16.95g) as against 16.29 and 12.62g recorded for 18% CP and 16% CP diets respectively. Feed intake was not significant between T1 and T2, but differed significantly with T3, (Table 2). However, the values in this study agree with the report of (Okeke and Oluremi 2003) who obtained average daily feed intake of 12.1g per bird but lower than the 23g reported by (NVRI, 1996).

Table 2 also shows the result of water intake which indicated a mean range of 23.7 – 35.2mls per individual per day. Significantly ($P<0.05$) higher water intake were recorded with corresponding increase in dietary protein. Feed efficiency ratio differed significantly due to dietary treatment i.e. 0.18, 0.17 and 0.19 for T1, T2 and T3 respectively (Table 2). The result showed that quail birds fed with higher crude protein levels attained sexual maturity and full feathering (two weeks) earlier and started egg production earlier than birds on T2 and T3 diets. Egg production values were 44 (81%), 7 (12%) and 3 (5%) for T1, T2 and T3 respectively.

CONCLUSION

From the results obtained in this study in all the observed parameters, feeding commercial diets with 19% CP and 350.4 ME KCal/kg will guarantee optimal performance in growing and laying quail.

REFERENCES

- Barret J., (1989). A quail in every pot. An old delicacy finds a new public. Adopted from New York Times. June 21, 1989.
- Begin J.J. And Baldine J.T. (1968). A comparison of the ability of the Japanese quail and light breed chicken to metabolize and utilize energy. *Poultry Science* 47:1278
- Bruce A. And Latshaw J.D (1981). Growth and energy retention of broilers as affected by pelleting and density of the feed *Poultry Science* 60:1630.
- Cooper, D.M. (1987). The Rearing and Maintenance of SPF Flock. The Japanese Quail WFAN Handbook on. Care and Management of Laboratory Animals. 6th Ed. PP.678-680
- Haruna E.S. And Sanyaolu O. (1993). Comparative studies on production of broilers and quail birds unpublished.
- Macnaughton, J.L. And Reece F.N. (1982) Influence of dietary energy on effectiveness of pelleting. *Poultry Science* 61:1389.

Okeke A.U. and Oluremi O.I.A. (2003). The effect of *Amaranthus* (*Amaranthus hybridis*) and Lettuce (*Lactusa sativa*) leaves in the diet of Japanese quail (*coturnix Coturnix Japonica*) on performance and egg quality. Proc. 28th Ann. Conf. Nig. Soc. For Anim. Prod. 28:173-176.

NRC (1991). Micro-livestock. National Academic Press Washington D.C. Pp. 147-155.

NVRI, (1996). Farmers Training on Quail Production and Health Management. National Workshop on quail; Sept. 12-14, NVRI, Vom Pp. 8-24.

Whyte E.P.; Ahmed Y., Usman M.; Haruna E.S. And Ndam J. (2000). Performance of quail birds feed different levels of protein. Nigerian Journal of Biotechnology. 11(1):67-71.

Wilson W.O., Abboh .A And Applanalp, H. (1959). Developmental and physiological studies with a new pilot animal for poultry. *Coturnix* quail. Poultry Science 38:1260-1.U.K.

NUTRITIONAL QUALITIES OF MUSHROOM

S.A. Ogedegbe and A.A. Makinde

National Veterinary Research Institute, Vom.

Email: sundayogedegbe@yahoo.com

INTRODUCTION

Mushrooms are macro fungi with distinguishable fruiting bodies that are large enough to be seen and hand-picked (Wilson, 2004). About 10,000 species of macro fungi make up the mushroom genera. These species are roughly categorized into edible (5000), medicinal (2000), poisonous (1000) and others (2000). Mushrooms are primarily cultivated for their nutritious and medicinal attributes. There is a large un-estimated mycophagic population in Nigeria who depend on wild indigenous mushrooms whose production is unpredictable.

Nigeria with over 150 million people to feed is grappling with the problems of malnutrition and poverty. These call for creative solutions. One of these solutions is the identification of sources of nutrients for the populace. Considered a health food, the mushroom contains reasonable quantities of vital nutrients and would therefore serve as a comparatively cheaper source of protein and vitamins.

Mushrooms are also widely coveted for their medicinal usefulness. In Asia, several species are grown for this purpose. In 1997, income from mushroom-based pharmaceutical and nutraceutical products was estimated at US 3.3 billion dollars. Modern cultivation techniques which are more reliable employ the use of spawn and substrates in controlled environments in the production of edible and medicinal mushrooms. Mushroom farming is ecologically friendly and being largely heterotrophic, is grown on composted or pasteurized organic wastes which hitherto posed health hazards. The spent substrate could be used to feed animals or applied to soil for enrichment.

NUTRITIONAL QUALITIES OF MUSHROOM

Most of the abundant nutrients in mushrooms are located in the cell wall composed of chitin. According to Oei (1996) the moisture content of fresh mushroom is 70-95%, depending on harvest time and environmental conditions. Moisture in dried mushrooms is between 10-13%. The protein content considered to be of good quality is 3-4% and 19-35% on fresh and dry weight basis respectively. This implies that the protein content of edible mushroom is higher than those of Onion (1.4%), Cabbage (1.4%), Oranges (1.0%) and Apples (0.3%). In comparison to animal protein, pork (9-16%), beef (12-20%) and chicken (19-20%) mushrooms also fair well on a dry weight basis.

Mushrooms contain all the nine essential amino acids with lysine being the most abundant. Although lacking vitamin A, they are rich in Thiamine (B1), Riboflavin (B2), Ascorbic acid (C) and biotin. They have high levels of phosphorous, sodium, potassium, fibre and carbohydrates but are low in calcium and fat.

MEDICINAL PROPERTIES OF MUSHROOM

The medicinal attributes of mushroom have long been recognized in China, Korea and Japan. The lower fungi are known for penicillin production and other antibiotics. Several triterpenes and polysaccharides have been isolated from mycelia and basidiocarps of mushrooms. Most of the extracts are known to strengthen the immune system. *Lentionin*, a polysaccharide from *Lentinula edodes*, has been successfully marketed in Japan (Oei, 1996) for this purpose.

Mushrooms have also been used to treat haemorrhoids, stomach ailments, gastric ulcers etc. The prominent medicinal species are *Auricularia spp.*, *Tremella fusiformis*,

Hericuim erinaceus, Volvariella volvacea and Ganoderma lucidum.

CULTIVATION OF MUSHROOMS

Mushroom cultivation is based on different methods which combine five basic steps; production of culture or spawn, preparation of substrate, inoculation and fruiting of substrate and the harvesting of fruiting bodies (mushroom).

The production of culture or spawn is often carried out in standard mushroom laboratories or culture collection centres. There are basic requirements and specialized procedures for spawn multiplication which are beyond the reach of the rural mushroom farmer. For these reasons, farmers purchase their spawn from laboratories.

Various agricultural wastes from farms, factories, breweries and homes such as corn leaf, corn cobs, sugarcane wastes, oil palm bunch, banana leaf, sawdust, grass etc can be used as substrates. The Juncao technique in Fuzhou, China utilizes 27 different grasses as substrates to cultivate 38 different mushrooms (Wilson, 2004). The substrates are cut or chopped into tiny pieces and bagged before being pasteurized or sterilized as in the case of the plastic bag method for cultivating *Pleurotus spp.* Sometimes, the substrates are composted before bagging and sterilization as used for *Agaricus biflorus*.

In the plastic bag method, the substrate is bagged in heat resistant polypropylene or high density polythene bags. Each bag is fitted with a plastic neck of 2.5 cm diameter 'PVC' pipe. The bags are then steam sterilized at 100°C for 2-3 hours. After cooling, the bags are sent to the inoculating room where each bag is spawned with up to 5g of good quality spawn.

The spawned bags are then sent to a partially dark incubation room where the temperature is maintained at 26-30°C for complete mycelia colonization of the substrate. After substrate colonization, the bags are taken to the cropping house for fruiting. A high relative humidity of 85-95% and temperature in the range of 24-30°C are needed for good fruiting. It takes between 5-7 days for pin heads to appear and 2-3 days for harvest to begin. The yield is affected by several factors.

CONCLUSION

Principles never change. When correctly applied predicted results are obtained. Owing to the ideal environmental conditions, relatively low input requirement, suitability to rural agricultural development, high nutrient quality and income generation potential, mushroom cultivation is recommended for further development in Vom.

ACKNOWLEDGEMENT

The senior author wishes to acknowledge the Director of the National Veterinary Research Institute, Vom. Dr (Mrs.) L.H. Lombin for sponsoring his participating in the Mushroom training course at Songhai Centre, Porto Novo, Republic of Benin.

REFERENCES

- Krieger L.C.C. (1967). The Mushroom Handbook, Dover Pub Ltd N.Y.
- OEI P. (1996). Mushroom Cultivation. Tool Publication. Lei Den.
- Raven P.H., Evert R.F. and Curtis H. (1981). Biology of Plants. Worth Pub Inc.
- Wilson W. K. (2004). Lecture Materials at Songhai Centre, Porto-Novo.

RATIONAL USE OF ANTIBIOTICS IN VETERINARY MEDICINE: A REVIEW

¹N. J. Luther and ²Daniel Bott,

¹Viral Research Department, e-mail: luthernj@afrione.com

²Department of Biochemistry and Applied Molecular Biology,
National Veterinary Research Institute, Vom

INTRODUCTION

The introduction of antimicrobial therapy was a great advance for modern medicine and the current availability of antibiotics in veterinary medicine makes it possible to treat susceptible bacterial infections that in the pre-antibiotic era may have caused severe economic losses or even death in livestock. In a recent survey of veterinary clinics we conducted around Jos and Bukuru metropolis of Plateau State, we discovered that antibiotics top the lists of prescribed veterinary drugs, followed by antiprotozoans, analgesics, corticosteroids and hormones (unpublished data). In Jos and its environs, it is common practice for farmers to purchase antibiotics from Agro-vet shops without any prescription from a registered veterinary surgeon. In this process, they use antibiotics with little or no regards for correct dosage and dosing regimen. This may temporarily control the disease, but the long-term effects are usually often grave with the possible development of resistance. This may eventually have serious health implications to both animals and humans, especially if the agent involved is of zoonotic significance. These widespread and often injudicious uses of antimicrobial agents have resulted in major problems associated with bioavailability; antibiotic combinations and selection; prophylactic use; and bacterial resistance. The impact of these developments is the subject of this review. This review is to reacquaint us with the basics of antibiotics therapy and its rational use in veterinary medicine. The terms 'antibiotic' and antimicrobial agents' are used synonymously for compounds of natural, semi-synthetic and wholly synthetic origin, which are used clinically for their actions against microbial pathogens.

KEYWORDS: antibiotic, antimicrobial, bacteria, therapy, dose

Antimicrobial Agents for use in Veterinary Medicine and some examples

A. Penicillin e.g

- i. Benzyl penicillin
- ii. Phenoxymethyl penicillin
- iii. Cloxacillin
- iv. Amoxicillin/Clavulanic acid
- v. Carbenicillin

B. Cephalosporins

- i. Cephalexin
- ii. Cephapirin

C. Tetracyclines e.g

- i. Oxytetracycline
- ii. Chlortetracycline
- iii. Tetracyclines
- iv. Doxycycline
- v. Methacycline

D. Aminoglycosides

- i. Streptomycin

- ii. Neomycin
- iii. Gentamicin

E. Macrolides

- i. Tylosin
- ii. Erythromycin
- iii. Azithromycin
- iv. Roxithromycin

F. Lincosamides.

- i. Lincomycin
- ii. Clindamycin

G. Peptides e.g.

- i. Bacitracin
- ii. Polymyxin B

H. Nitrofurans

- i. Nitrofurazone
- ii. Furazolidone

- iii. Nitrofurantoin
- iv. Furaladone

vii. Sulphamerazine or Trimethoprim

I. Sulphonamides

- i. Sulphadimidine
- ii. Sulphadimethoxin or Trimethoprim
- iii. Phthalyl Sulphathiazole
- iv. Sulphacetamide
- v. Sulphaguanidine
- vi. Sulphadiazine or Trimethoprim

J. Others

- i. Chloramphenicol
- ii. Spectinomycin
- iii. Tiamulin
- iv. Quinolones
- v. Rifampin
- vi. Vancomycin

Classification and Sites of Action of Antimicrobial Agents.

Antimicrobial drugs can be classified broadly into:

- Bacteriostatic (i.e. act primarily by arresting bacterial growth e.g. Sulphonamides, Tetracyclines, Chloramphenicol, etc)
- Bactericidal (i.e. act primarily by killing bacteria e.g. penicillins, neomycin, streptomycin, etc).

This classification is only of academic interest, because most bacteriostatic drugs can be shown to be bactericidal at high concentrations (Laurence, et al, 1998). Antimicrobial agents act at different sites in the target organism as shown below.

Antimicrobial drug	Site of action
Penicillins, Bacitracin, Cephalosporins	Cell Wall
Polymyxin, Streptomycin	Cell Membrane
Sulphonamides, Nitrofurans, Quinolones	Metabolites and enzymes systems
Aminoglycosides, Tetracyclines, Macrolides, Chloramphenicol, Lincosamides	RNA & ribosome, interfering with protein synthesis

Bioavailability

Bioavailability is used to describe the rate and extent to which a drug administered at a particular dosage form enters the systemic circulation intact. The goal of antibacterial therapy is to obtain at the site of infection an effective concentration rapidly while at the same time achieving as prolonged an effect as possible with a single dose. The concentration at the site of infection can be influenced by absorption, distribution, elimination and by-product formulation.

Antibiotic Combinations

Since the inception of antibiotic combinations, it has been possible to produce preparations of two or more antibiotics on the basis that the mixture is either more potent, less toxic or has a wider range of activity than one compound used on its own. Indications for the use of antibiotic combinations include overwhelming infections e.g. bacteraemia; mixed infections e.g. contamination of surface wounds, otitis externa or skin abrasions; to avoid the emergence of resistant mutants; to achieve synergism and to reduce adverse reactions.

It should be noted that fixed antibiotic combinations containing three, four or more chemotherapeutic agents are undesirable, expensive and are frequently a useless luxury (Francis, 1977). This is because it is unlikely that the proportion of each compound present will be optimal for all types of infection in all domestic animals. Moreover, individual animals may modify the components due to differences in bioavailability. It is our

considered opinion that veterinary surgeons should desist from the purchase of mixtures of antibiotics. However, where it is considered desirable to administer more than one antimicrobial agent to an animal; they may be given separately as indicated. Sometimes, antibiotics are combined with other compounds e.g. corticosteroids or vitamins. It is difficult to justify the existence of such fixed dose combinations on grounds other than convenience.

Prophylactic Use of Antibiotics

In general, antibiotics should not be used for prophylactic reasons or as growth promoters in order to avoid the emergence of resistant bacteria.

Bacterial Resistance

The usefulness of an antibiotic depends not only upon its antibacterial potency and spectrum of activity, but also on the prevalence of resistant organism and the extent and severity of the adverse reactions to which it may give rise. Resistance may develop in bacteria as a result of: enzyme adaptation (e.g. Penicillinase; β -lactamase); selection of resistant mutants and transfer of a resistant factor.

Antibiotic Selection and Dosage

To properly select an antimicrobial agent, there is a need for correct diagnosis. The causative organism must have been identified on the basis of bacteriologic culture and sensitivity. A major cause of therapeutic failure associated with the use of antimicrobial drugs is when improper dosing regimens are maintained or when suboptimal doses are administered. These errors commonly result when the veterinary surgeon guesses the weight of his patient wrongly. This frequently results in the over dosing of small animals and the under dosing of large animals.

Over dosage is wasteful and expensive, and occasionally dangerous; but is generally less serious than under dosage, since most antibiotic preparations have a wide therapeutic ratio. Under dosage will inevitably increase the problem of resistant organisms.

CONCLUSION

Antibiotics have proved to be of great value in veterinary medicine for the treatment of infections. Proper usage of these therapeutic resources is essential. Antibiotics should never be used as a placebo merely to satisfy an owner or as a general "cover" or substitute for proper hygiene and husbandry, but only when circumstances justify their use.

REFERENCES

- Austic, F.H (1977): A rational approach to the use of antibiotics in Veterinary practice. Irish Vet. J 31:26-32.
- Buckwold, F.J and Ronald, A.R (1979): Antibacterial misuse effects and suggestions for control. J. Antimicrob. Chemother. 5: 129-136.
- Colloquium on clinical pharmacology (1980): JAVMA 176:1041-1203.
- Index of Agro-veterinary specialties. Meder publications, Ikeja. Vol 2; No 1 pp1-48. 1984.
- D.R. Laurence; P.N. Bennett and M.J. Brown Clinical Pharmacology. 8th Ed. In Churchill Livingstone Ed. 187-215.

AFRICAN LOCUST BEANS AS PROTEIN SUPPLEMENT IN THE DIET OF BROILERS: EFFECT ON GROWTH RATE AND CARCASS YIELD

P.W. Erakpotobor; J. D. John, S.A. Ogedegbe and S.L. Mustapha²

Federal College of Animal Health and Production Technology, N.V.R.I, Vom, Nigeria.

²National Productivity Centre, Bauchi, Nigeria.

ABSTRACT

A 56-day study was carried out to ascertain the growth performance and carcass characteristics of broiler birds fed with African locust beans. Thirty-day-old broilers were reared on deep litter system and assigned to three different treatments. The treatments were 0% (control), 15% and 30% inclusion levels of locust beans for treatments 1, 2 and 3 respectively. The data obtained were subjected to ANOVA. At the expiration of the experiment, two birds from each group were slaughtered and analysed for their carcass yield. Mean daily weight gains were 12.1, 11.8 and 12.3g for T1, T2 and T3 respectively. Final live weight gains averaged 1.36, 1.31 and 1.40kg for T1, T2 and T3 respectively. There was no significant difference between birds fed with locust bean meal and those fed soyabean meal (control). The study recommends an adequate utilization of African locust beans for broiler chickens when substituted at 30% level of soya beans.

Keywords: Locust beans, protein supplement, growth rate, carcass yield.

INTRODUCTION

The African Locust Bean (ALB) whose seeds contain up to 30.4% crude protein belongs to the family *Leguminous* and has two botanically related species namely *Parkia* and *Clappertoniana*, both occurring, typically in the wet savannah zones (Aduku, 1992). *Parkia* has been used by most Nigerian households for glazing pottery, cooking oils, anti diarrhoeal agent, prevention of leprosy, fish catching and for cooking. In Nigeria, the pressure on the requirements for animal (poultry) feed and the scarcity of ingredients have resulted in feed manufacturers calling for research into non-conventional local products of legumes. Thus, the future of the poultry protein contribution will depend largely on how economically poultry meat and eggs are produced. The price of feed is a major determinant of the profitability of poultry production. However, it is important to balance feed cost with broiler performance since the least cost ration may fail to support the highest productivity.

Broiler production gives a lot of returns to the farmer if properly managed. The broiler business requires large investment in the short term. Capital and feed alone represent about 70% of the total cost of producing meat, milk and eggs (Oluyemi and Roberts 1979, Abubakar, 1998; Whyte, 2000). Since feed is the largest single item of cost in broiler production, it follows that the rate in which feed is converted into poultry meat, is an important measure of efficiency. Therefore, it is imperative that economically and nutritionally balanced diets are provided during all phases of growth in broiler chicken. The objective of this study was to investigate the effect of the African Locust Bean (ALB) seed on the growth rate and performance of broilers as well as provide alternative protein source to other conventional proteins such as soya beans, groundnut cake and fish meal.

MATERIALS AND METHOD

Thirty day-old Anak broiler chicks were used for this study. The broiler chicks were grouped into three and each group of 10 birds were randomly placed into two replicates of 5 birds each. The birds were housed in a thoroughly cleaned, washed, disinfected and fumigated room. The room was partitioned into three and each partition further

divided into two compartments. Wood shaving was spread on the floor of each compartment, while the drinkers and feeders were placed at strategic locations within each partition. Brown cardboard paper was spread on the wood shaving in order to prevent the chicks from picking the shavings as feed. One week after fumigation the chicks were brought and randomly placed in the three treatment groups. Vaccination schedules were strictly adhered to while dewormers, antibiotics and anticoccidial drugs were administered as needed. The experiment lasted for 56 days. Feed and water were given ad libitum. Weight gain and carcass yield were determined and data generated were statistically analysed using analysis of variance procedure (ANOVA).

RESULTS AND DISCUSSION

The ingredients used in formulating the experiment diets are presented in Table 1.

Table 1: Experiment Diets (kg)

Ingredients	African Locust Beans(ALB) Levels		
	D1 (0%)	D2 (15%)	D3 (30%)
Maize	28.15	28.15	28.15
Wheat offal	32.0	32.0	32.0
Soya bean meal	36.0	30.6	27.0
Bone meal	2	2	2
Limestone	1	1	1
Methionine	0.10	0.10	0.10
Lysine	0.20	0.20	0.20
Salt	0.30	0.30	0.30
Premix	0.25	0.25	0.25
African Locust Beans (ALB)	-	5.40	9.00
TOTAL	100	100	100

Table II: Performance and carcass cut-up yield (kg)

Parameters/(Organ weights)	Dietary treatments			Mean	SD	SEM
	T1	T2	T3			
Live weight (kg)	5.46	5.29	5.60	5.45	+0.13	0.08
Av. weekly wt. gain/bird (g)	0.68	0.66	0.70	0.68	+0.02	0.01
Av. daily wt. gain/bird (g)	12.14	11.80	12.3	12.08	+0.21	0.21
Carcass cut –up (kg)						
Thigh	0.30a	0.25b	0.35c	0.30	+0.04	0.02
Breast	0.40a	0.30b	0.27c	0.36	+0.04	0.02
Back lower	0.10a	0.10a	0.10a	0.10	0	0
Neck	0.10a	0.10a	0.10a	0.10	0	0
Wing	0.13a	0.15b	0.18c	0.15	+0.02	0.01
Head	0.08a	0.03b	0.05c	0.14	+0.01	0.00
Leg	0.10a	0.10a	0.08ab	0.09	-	0.00
Total	1.21a	1.30b	1.23c	1.24	-	-

abc means in the same row with different subscripts differ significantly ($p < 0.05$).

The mean weekly gain (Table 2) showed that birds on T3 (i.e. 30% ALB inclusion level) gained the highest weight of 0.70kg compared to those on T1 (0.68kg) and T2 (0.66kg). The average daily weights were 12.4, 11.8 and 12.3g for T1, T2 and T3 respectively. These values were not significantly ($P > 0.05$) different due to dietary treatment. This result agreed with the observations of (Oluyemi and Roberts 1979; Yousouf and Balogun 1999; that the nutritive value of Parkia compares favourably to that of other conventional

proteins like soya beans and groundnut cake meal.

At the end of the experimental period two birds from each group were slaughtered and evaluated for their carcass yield. The values obtained (Table2) indicated that there was no significant ($P>0.05$) difference in the carcass yield due to dietary treatments. Similar reports have been documented by Dalziel and Hutchison (1955) and Oyenuga (1968). The use of non conventional feedstuffs to raise livestock and poultry has been elucidated by (Abubakar and Iman 1995; Abubakar, 1998).

CONCLUSION

The increasing Nigerian population requires animal protein food both in quantity and quality but the nation's livestock resources cannot provide these requirements due to unavailability of year round feedstuff. The use of *Parkia* (ALB) as a cheap and unconventional source of protein is advocated. It was economical to include African locust bean up to 30% in the diet of poultry in this study.

REFERENCES

- Abubakar, M.M and Imam M.A (1995). Use Of Unconventional Feedstuffs For The Production Of Unconventional Livestock In Semi-Arid Zone In: Development and Resource Management In The Dry Belt Of Nigeria. Proceedings of The 35th Annual Conference Of Nigerian Geographical Association.
- Abubakar, M.M (1998). Utilization of Unconventional Feedstuffs For Sustainable Livestock Production. Inaugural Lecture Series No. 9 Abubakar Tafawa Balewa University, Bauchi, Nigeria.
- Aduku, A.O (1992) Practical Animal Feed Productions in The Tropics. 1st Edition. Published By S. Asakoma Co. Publishers Pp 8-28.
- Dalziel J.M and Hutchison J. (1955) *Parkia Biglobosa*. The Useful Plant of West Tropical Africa 2nd Reprint. Printed In Great Britain By The White Friars Press, Watmongus Ltd. Pp 179-272.
- Oluyemi, J.A and Roberts F.A. (1979). Poultry Production In Warm Wet Climates, 1st Edition Macmillan Publishers Ltd London. Pp 133-134.
- Oyenuga K.A (1968). Nigeria Food and Feeding Stuffs, their Chemistry and Nutritive Value. 3rd Edition, University Press Ibadan, Nigeria Pp 50-52
- Whyte E.P. Ashigidi A.E and Marok P. (2000). Effects of Feeding Varying Levels of Dried Chick Excreta in Growth Performance of Broilers. Proc. 13th Ann. Conf. of Biotechnology Society of Nigeria 31 March – 2nd April NDA, Kaduna Pp. 5.
- Yousouf, M.B and Balogun, O.O (1999). Value of African Locust Beans (*Parkia Filicoida* Welm) In the Rabbit. Proceedings of the 26th Conference of Nigerian Society of Animal Production, March 21-25 Ilorin, Nigeria Pp 174-175.

DEVELOPING A PERSONAL PENSION SCHEME: OPPORTUNITIES AVAILABLE IN OWNING SHARES

Ikeobi Nneka R. ACA

Federal College of Animal Health and Production Technology
National Veterinary Research Institute, Vom
Email nikeobi2002@yahoo.com

INTRODUCTION

At retirement, a worker is faced with a situation where he earns less income. However, this needs not be the case if the worker has taken careful, deliberate plans to ensure that he continues to live comfortably long after disengaging from an active working life.

Developing a personal pension scheme involves making a conscious effort to “DO IT YOURSELF”. It demands that one put money aside now which will be invested to ensure a steady flow of income when one is too old to work.

SAVING FOR INVESTMENT

Before you can invest, you need to save. Saving is the act of setting money aside from your income. It is the process of deliberately placing funds into a separate account, a share account with a stockbroker, a money market fund, or a retirement savings plan.

Investment is the act of taking the process to the next level. Investment puts your savings to work for growth potentially beyond the minimal interest you would earn if you were to leave your savings alone in a savings account or money market fund.

You can only achieve financial freedom by making investing a part of your daily life. The first to know above all else, is that investing starts with you obeying a fundamental law “learn to pay yourself first”. That little fund you pay yourself, which should not be less than 10% of your income, is now seen as a charge on your income and if invested with careful planning, will grow at a compounding rate all through the period until you are ready to retire. It is important to note that it is not how much you earn or make that is important, but how much of it you keep (to work for you). Think of your money as employees working for you. The more money you send out into the world to work for you, the more money you can accumulate to produce wealth for you. As an investor therefore, your job is to find opportunities to invest your money and share ownership is one of the most profitable and convenient avenues available.

Why Shares?

Shares represent the money contributed into a business concern with the right to a portion of the profits. Once you acquire the shares of a company, you become a part-owner of the company. As a part-owner, you can participate in the choice of who runs it, how it will be run and if you don't like those who run the company, you can work with other shareholders and remove them from office.

Types of shares

Generally a share is first looked at as either a **growth share** (shareholders are looking for price appreciation), or an **income share** (shareholders own it to earn income from its dividends). Shares are also commonly referred to using names based on the life cycle of the company.

Speculative shares

These are shares in relatively new companies which have not yet established themselves in their product or service market. They may also be companies in high risk

businesses, such as the internet, biotechnology, and a number of other highly competitive and money-intensive industries.

Growth shares

These are shares in companies that have moved beyond the phase of uncertainty but still have a lot of room to grow. The more they grow, the more share price movement investors can expect to see.

Value shares

These are shares in well established companies with histories of consistent earnings and growth.

Blue chip shares

This title is reserved for shares of only the most established companies. They have long histories of solid growth and earnings and a strong foothold in their market. They are characterized by high market price as demand for them is very high.

ANALYZING THE STOCK MARKET

Many people who put their money in shares fail to recognize that investing in shares is like buying into a company. It makes sense therefore, that before you put your money in shares, you should ask questions you ought to ask if you want to buy into a company. Would you put your money in a company without due diligence that will reveal the financial health of the company, its product range, its recruitment policy, its management team, its debt position and other barometers of financial well-being? Yet this is what many stock investors do. A smart stock investor would call his broker only after he has decided on the company he wants to invest in rather than allow the stockbroker to dictate where he would put his money. The ability to read the Stock exchange daily official list with some bit of analysis using the published accounts of companies will enable an investor to take intelligent investment decisions.

Where to start

The smartest place to start this exercise is to learn how to interpret the stock table (Daily Official List) published daily from Monday to Friday by the Nigeria Stock Exchange. This can also be found in some daily newspapers and weekly financial papers such as Financial Standard and Business Times. The stock market table consists of 11 main columns accommodating ten sub columns. They are meant to assist the reader in understanding the position of the market. Taken together, they can assist the reader to understand the market status of every listed share.

Emerging Markets SECOND-TIER SECURITIES																
Ordinary Share	Public Quotation Price(N)	Current Market Price(N)	Ex-Div/Sc	Business Done			This Year's		Last Ex-Div Date	Last Ex-Sc Date	Dividends			E.P.S.	P.E. Ratio	
				Price(N)	Date	Quantity	High	Low			Date Pd	Inter.	Final			
ADSWITCH PLC.	0.20	0.43	-	0.43	10/03/05	3,000	0.45	0.43	14/10/02	16/10/01	10/02/03		0.04	0.00	0.00	
AFRIK PHARMACEUTICALS PLC.	0.50	0.45	-	0.45	24/07/03	100	0.45	0.45	11/06/03		03/07/03		0.05	0.11	4.05	
ANINO INTERNATIONAL PLC.	0.25	0.22	+	0.22	10/03/98	1,000	0.22	0.22	28/07/92		28/09/92		0.02	0.00	0.00	
CAPITAL OIL PLC	0.25	0.37	+	0.37	28/01/05	2,000	0.37	0.37	19/02/01		24/04/01		0.03	0.00	0.00	
CUTIX PLC.	0.50	1.24	+	1.24	10/03/05	2,000,000	1.58	1.24	13/10/03	12/10/01	13/02/04		0.10	0.25	4.96	
FLEXIBLE PACKAGING PLC.	0.50	0.50	-	0.50	22/07/03	100	0.50	0.50	11/10/93					0.00	0.00	
JULI PLC.	0.50	0.52	-	0.52	28/02/05	1,000	0.52	0.52	21/09/99		30/09/99		0.07	0.00	0.00	
KRABO NIGERIA PLC.	0.20	0.13	-	0.13	21/04/04	1,500	0.13	0.13						0.00	0.00	
NEWPAK PLC.	0.50	1.05	-	1.05	24/01/05	600	1.05	1.05	17/11/97		05/01/98		0.12	0.00	0.00	
RAK UNITY PET. COMP. PLC.	0.20	0.30	-	0.30	19/06/01	2,000	0.30	0.30	22/12/92		28/01/93		0.03	0.00	0.00	
ROKANA INDUSTRIES PLC.	0.50	0.50	-	0.50	05/10/04	1,815,250	0.50	0.50	15/11/96		02/01/97		0.10	0.14	3.57	
SMART PRODUCTS NIGERIA PLC	0.50	1.45	-	1.45	14/10/03	120	1.45	1.45	24/07/96		21/08/96		0.08	0.00	0.00	
TROPICAL PET. PRODUCTS PLC.	0.50	0.29	-	0.29	13/09/04	700	0.29	0.29	06/11/92		21/12/92		0.03	0.00	0.00	
UDEOFSON GARMENT FACT. NIG	0.50	0.50	-	0.50	14/04/00	2,000	0.50	0.50						0.00	0.00	
UNION VENTURES & PET. PLC	0.50	0.56	-	0.56	30/12/04	335,296	0.56	0.56	02/12/97	14/09/01	23/01/98		0.02	0.05	9.33	
W.A. ALUM. PRODUCTS PLC	0.50	0.50	-	0.50	03/04/98	214	0.50	0.50			18/09/96		0.15	0.30	1.67	

CLASSIFICATION

Companies are grouped under sectoral classifications in alphabetical order with the second-tier securities topping the list and followed by the first-tier securities.

- Column 1: Ordinary Shares- This shows the names of the companies whose shares are traded in the market.
- Column 2: Public Quotation Price- It is an assigned amount used to compute the Naira accounting value of the common shares.
- Column 3: Current Market Price- This is the price both the buyer and the seller currently consider fair. The plus (+) and minus (-) signs on each of the prices are meant to convey the level of demand.
- Column 4: Ex- Div and Ex-Sc- These indicate whether the shares have been marked down either for dividend payment (Ex-Div) or for scrip payment (Ex-Sc). These signs are helpful in that they indicate those that are qualified to earn dividend or scrip.
- Column 5: Business Done- There are 3 sub-columns under this. This column provides some historical information for the purpose of keeping accurate records of business transactions. It shows the price at which the last trading was done, the date and the quantity of shares traded.
- Column 6: This Year's High and Low- Indicate the highest and the lowest prices for the shares in the past 52 weeks.
- Column 7: Last Ex-Div Date- This indicates the day the company was last marked for dividend payment.
- Column 8: Last Ex-Sc Date- Indicates the date the company was last marked for scrip payment.
- Column 9: (3 sub columns) - Meant to indicate vital dividend information covering date, interim and final dividends paid.
- Column 10: EPS- Means Earnings Per Share- This is one column watched closely as it generally indicates the cash generating power of the company which has issued the shares.
- Column 11: P/E Ratio (Price Earning Ratio) - This simply shows the relationship between a share's price and the company's earnings for the past 12 months.

CONCLUSION

To ensure that one has a functional personal pension scheme demands that one has a well planned portfolio of stocks that will guarantee a steady flow of income at retirement. Choose a portfolio of between 5 and 10 shares of quoted companies and pick across sectors. This will give you enough time to concentrate on monitoring. Pay attention to information from the grapevine and learn to keep a tab on what is going on inside the company whose shares you are investing in.

ACKNOWLEDGEMENT

I wish to thank Mr. Emmanuel Onoja of Zenith Bank Plc, Bauchi, Mr. Luka Pam of PIPC, Jos who provided me with some of the materials used for this work. My thanks also go to Edore Akpokoje and Patrick Adeleye for their contributions.

REFERENCES:

- Akindipe, F.A. (2002). Techniques of Making Money in Shares. Flarmak & Company.
- Arowolo, A., Awoyemi, O., Akinyemi, A. and Oluwole, O. (2004). Buy Shares. Own a Business. Money wise Handbook Series: Vol. 1, No. 1.
- Arowolo, A., Awoyemi, O., Akinyemi, A. and Oluwole, O. (2004). Become your own Analyst. Money wise Handbook Series: Vol.1, No. 2.
- Kiyosaki, R.T. and Lechter, S.L. (1997). Rich Dad, Poor Dad. Time Warner Paperbacks, UK.
- Kiyosaki, R.T. and Lechter, S.L. (2000). Guide to Investing. Time Warner Books.

GENERAL PRINCIPLES OF DIAGNOSIS AND DISEASE TREATMENT IN TRADITIONAL CHINESE VETERINARY MEDICINE

Dr. P. R. Kumbish

Diagnostic Department, NVRI Vom.
Email:petersidekumbish@yahoo.co.uk

INTRODUCTION

Traditional Chinese Veterinary Medicine (TCVM) is a scientific summary of the rich experience of the Chinese nation's struggle against disease. It is deeply influenced by the thoughts of ancient Chinese Philosophy, psychology and culture. It applies dialectical thinking to research on the laws of human activities from a microscopic and systematic point of view. It has therefore gradually formed a unique theoretical basis, diagnosis and disease treatment technique that has made an indelible and substantial contribution to the production and health of animals in China and Eastern Asia in particular.

HISTORY

TCVM theory developed and expanded mainly from practice and experience over the past 4000 years. In the struggle against hunger and disease the ancient Chinese were to discover that some foods, herbs, plants and roots could relieve or even eliminate diseases. Thus this was the origin of the development and application of Chinese herbal medicine. Gradually the method of hot compresses and moxibustion for the treatment of certain ailments was also developed. There are four generally accepted phases in the development of TCVM. These include, The Yellow Emperor's Canon of Internal Medicine, Classics on Medical Problems, Treatise on Exogenous Febrile and Miscellaneous Diseases and Shennong's Herbal Classics (with 365 different kinds of herbs recorded in this book concerning the Pharmaceutical Theories).

DISEASE DIAGNOSIS IN TCVM

The approach adopted in TCVM for the differentiation of syndromes is primarily based on determining the cause of illness, which is also referred to as aetiology.

AETIOLOGY

In TCVM, it is known as the study of the causative factors of disease. It is held that there is a state of relative equilibrium between the animal body and the external environment, but this usually is in a state of constant self-adjustment and in this way normal physiological activities are maintained. When external influences exceed the powers of adaptability of the organism, or if the body is unable to adjust to changing conditions, then this relative equilibrium will be lost, and disease will ensue. This forms the basic concept regarding aetiology and pathogenesis in TCVM. Numerous factors can cause disease and these include exogenous factors, the harmful internal factors and others.

The six exogenous pathogenic factors are wind, cold, summer-heat, dampness, dryness and fire.

The general pathogenic characters of the six-exopathic factors are their pathogenesis which is often connected with seasons and environmental conditions. Each of these factors may cause disease alone or in conjunction with others. They may not only influence each other but can also transform into one another under certain conditions. The factors usually invade the body through the body surfaces e.g. mouth, nose or through both simultaneously.

In addition to diseases caused by the six exogenous pathogenic factors, there are other diseases caused by functional disturbances of the Zang-Fu organs. These pathological changes are therefore referred to as internal (endogenous) factors e.g. improper feeding, overstrain, stress and lack of physical exercise.

PATHOGENESIS

In TCVM, Pathology means the mechanism of onset, development and change of a disease condition. All these are related to the strength of the constitution of the ill animal and the nature of the pathogenic factor. When pathogenic factors invade the body, antipathogenic Qi fights the evil leading to a struggle between the vital and the evil. This in turn leads to a breakdown in relative balance of Yin and Yang, disturbs the descending and ascending movements in the viscera and disturbs the function of Qi and blood. Thus in TCVM, Pathogenesis of a disease falls under the struggle between vital and evil, imbalance of Yin and Yang, and disorders of ascending and descending Qi.

The struggle between the Vital and the Evil means the struggle between the antipathogenic-Qi and pathogenic factors. Thus the course of many diseases is the outcome of the struggle between the vital and the evil.

The imbalance of Yin and Yang is a pathologic state in which either yin fails to check yang or vice versa or when a superiority of either yin or yang results from a loss of the relative balance between yin and yang due to pathogenic factors on the body.
Disorders of Ascending and Descending qi.

Disorders of the ascending and descending of Qi are generally a pathological state reflecting a disturbance of viscera Qi in ascent, descent, exit and entrance along with disorders of yin-yang and Qi-blood. These disturbances may lead to dysfunctions of various tissues and organs such as viscera, limbs, sense organs and orifices.

DIAGNOSIS AND THE DIFFERENTIATION OF SYNDROMES

There are four diagnostic methods or tools in TCVM; Observation, Interrogation, Auscultation/Olfaction and Palpation.

Observation

Also known as inspection, it is a technique used by the Veterinarian to observe the exterior of the body for purposes of determining the condition of the animal's health and illness. This method includes observation of vitality, general appearance and the characteristics of the tongue.

Auscultation/Olfaction

This is also called "wen" and involves listening and smelling. Whining is heard in animals with colic; whistling in laryngeal hemiplegia; coughing with thick discharge indicates heat in the lungs.

Interrogation

This can be likened to history-taking in modern medicine as it entails asking owner about the disease condition in order to understand the pathological process.

Pulse Taking and Palpation

This is a very important diagnostic method in TCVM and involves pulse-taking by means of feeling of the animal's arterial blood pressure. Pulse is generally divided into the normal and pathologic pulses.

The pathologic pulse is further divided into five which include pulse marked by abnormal location e.g. floating, soft, deep, short & hollow, pulse marked by abnormal

frequency e.g. rapid, swift and slow and abnormal pulse rhythm e.g. knotted & intermittent. Others are the abnormal pulse shape e.g. full, thready, slippery & uneven and the abnormal pulse force e.g. that which is replete, feeble, weak and indiscernible.

Syndromes

This means to analyse and sort out clinical data collected on a wide scale so as to determine cause, location and nature of pathogenic changes which in turn leads to determining the prognosis of the disease condition. The differentiation of syndromes is therefore the essential pre-requisite for correct diagnosis and basis for treatment.

These methods are:

- Differentiating pathological conditions in accordance with the eight principal syndromes i.e. Yin&Yang, Exterior & Interior, Cold & Heat, Deficient & Excessive syndromes.
- Differentiation of syndromes according to pathological changes of the viscera and their inter-relations.
- Differentiation of syndromes according to the state of qi & blood and their inter-relations.
- Differentiation of febrile disease according to the theory of the six channels.
- Differentiation of the development of epidemic febrile disease by analysing the conditions of the four syndromes of wei, qi, yin, and xue systems.

GENERAL PRINCIPLES OF TREATMENT.

- The principle of the characteristics and function of traditional Chinese drugs are that each drug has its specific characteristic. These characteristics are employed to treat disease, rectify the hyperactivity or hypoactivity of yin or yang and help the body to restore its normal physiological functions.
- Drug Application is based on the principle of drug compatibility, contraindications, dosages and usage. Compatibility refers to the use of two or more drugs for the treatment of one particular illness. It is also referred to as mutual re-enforcement or assistance. This is usually done to strengthen their effects.

ACKNOWLEDGEMENT

I wish to express my sincere appreciation to the Director and members of IMC for finding me worthy to attend the training on behalf of the Institute. I pray that God will continue to guide you and grant you the financial strength to send others as the opportunity arise.

REFERNCES

Yu Chuan (1992): Veterinary Acupuncture and Moxibustion.

Fang Su Fang (2003): Traditional Chinese Veterinary Medicine (Training Notes)

THEORY AND APPLICATION OF ACUPUNCTURE AND MOXIBUSTION IN THE TREATMENT OF LIVESTOCK DISEASES

Dr. P. R. Kumbish.

Diagnostic Department, NVRI Vom.
Email: petersidekumbish@yahoo.co.uk

INTRODUCTION

The origin of Traditional Chinese Veterinary acupuncture and moxibustion can be traced back to ancient times. From the Yangshao ruins of Neolithic period in the Henan Province of China were found numerous bones of domestic animals, stone knives, bone needles and earthen-wares that were said to be used for treating animal diseases. An example of these is the “Bian-shi”, which means stones for treating diseases. This “Bian-shi” is known to cut boils and to stimulate some loci.

When animal husbandry appeared, the weapons for conquest of nature such as fire, polished stones and bone implements were used to fight animal diseases and to increase animal production. This forms the basis for the development of Veterinary acupuncture and surgical warm therapy (moxibustion). During the Shang Dynasty (16th –11th Century B.C.), metallic knives and bronze needles were used while Zao Fu, the famous specialist of animal husbandry and Veterinary Medicine had performed bloodletting on the neck of horses (974-928 B.C.)

Between 1840 &1949, the progress of veterinary acupuncture and moxibustion stagnated under the control of semi-feudal and semi-colonial societies of China. In 1904, Bei-yang Mi-yi school (Army Veterinary School) was established along side Western Veterinary Medicine. Both schools have since existed side by side.

EQUIPMENT, TECHNIQUES AND METHODS OF NEEDLE MANIPULATION.

Acupuncture Needles

Different needle types are used in traditional veterinary acupuncture and are made of stainless steel or its alloys. These include the round-sharp needle, filiform needle, three-edged, wide, Chuan-huang needles, Fire needle and gas releasing needle.

Preparation for Acupuncture Operation.

For each treatment, the proper needle size and length are selected. For safety and proper acupuncture treatment, the animal should be well restrained while the selected acupoints should be thoroughly cleaned and disinfected. The operator should have a sound plan of treatment and consider acupuncture a surgical procedure hence the necessary precautions should be observed.

Detection of Acupoints.

Acupoint therapy will be of no value if the points are incorrectly determined. The determination of point locations may be based on anatomical landmarks, proportional measurements and finger measurements. The different techniques for manipulation of needles are needle insertion and twirling. Needle withdrawal is by twirling or pulling. Other technical considerations include the angle and depth of needle insertion and the intensity of the stimulation. These factors are all interrelated and affect the success of treatment.

Angle of Needle Insertion

There are three basic angles of insertion, and the choice of any of them is dependant on the specificity of the point.

- Perpendicular Insertion: Needle is placed at 90° to the skin surface of the acupoint.
- Angular insertion: Needle is inserted at 45° to the surface of the skin of the point.
- Horizontal Insertion: a 15-25° angle of insertion is used for needling acupoints where the skin is thin and points are shallow. Each acupoint has its proper depth of insertion.

Intensity of Needle Stimulation

After the needle is correctly inserted (angle depth) the operator should ensure that he obtains “deqi”. There are three levels of needle intensity These may be intense; deep insertion, high amplitude and frequency or mild; shallow needle insertion with low frequency or intermediate. Intermediate intensity of stimulation is suitable for most of the conditions.

Management of Acupuncture Accidents.

1) Needle Bending: Caused mostly by strong muscle contraction or excessive movement of the animal while the needle is in place. To manage this, use one hand pressing against the skin while the other withdraws the needle without any twirling motion.

2) Needle Breaking: When wrong imperfect or damaged needles are used, breakage during acupuncture may occur. To manage if broken needle is partially exposed, remove it by hand or pair of forceps. But if it is deeply embedded in tissues, surgical procedure is needed.

3) Excessive Bleeding after Heamo-acupuncture: Caused by poor technique, careless operator or sudden movement of the animal. To Manage; calm the animal down and apply pressure on the injured vessel using fingers of haemostats.

4) Suppuration of the Needle Hole: This may be caused by unsanitary condition of the needle, fingers or skin area. Manage by washing and cleaning area with tincture, and if infection is severe, thorough medication may be necessary.

METHODS OF ACUPUNCTURE AND MOXIBUSTION

Methods of traditional Veterinary acupuncture include conventional (white needle) acupuncture, heamo-acupuncture (blood-letting), fire needling, pneumo-acupuncture, moxibustion, hot packing, cauterisation, cupping and massaging. In recent times various modern Veterinary acupuncture methods have also been developed. These methods include: aqua puncture (point injection), Thread embedding, Electro acupuncture, laser-puncture, magnet acupuncture, microwave acupuncture and auriculo-acupuncture.

Moxibustion

The word moxibustion originates from the Japanese word “mogusa” and is the use of herbs to stimulate Acupoints or locations of disorder. It is believed to have the therapeutic effects of dredging meridians, dispelling cold and wind, reviving yang and promoting functional activity of the animal. There are many ways to apply moxibustion, e.g. Moxa cone moxibustion and moxa stick moxibustion.

Hot Packing is a modified moxibustion method and it is used for the treatment of rheumatism in the back and hip of large animals.

Cauterisation was first reported during the Tang Dynasty in the book “Simu An-ji Ji” (A collection of ways to care and treat Horses). There are two types: Direct and Indirect.

Cupping is an ancient method of a combined vacuum and thermo-therapy. The cups used for cupping are made of bamboo, ceramic or glass.

Massaging, called “Tuina” (pushing and holding) is used to dredge meridians, tonify deficiency, remove excess, strengthen body resistance, dispel pathogens, sedation

and harmonize body yin and yang.

Aqua puncture Injection incorporates the benefits of both acupuncture and injection. The injection solutions are either herb extracts or common conventional drugs. The commonly used herbal extracts are *Angelica sinensis*, *Carthamus tinctorius*, *Coptis chinensis* and *Andrographis paniculata*. Common western medicines used are: sterile water, 5-10% dextrose, 0.25-0.5% procaine, Vitamin B1 and B12, antibiotics, anaesthetics, sedatives. Dosage is determined by the nature of the injection, site of injection and the number of acupoints.

Thread embedding may be taken as the point injection of a solid substance. It is used for the treatment of diarrhoea in young pigs, lameness and eye infection in large animals.

Electro acupuncture (EA) is the passing of an electric current to the animal through the needle and acupoint.

Laser puncture. Laser (light amplification by stimulated emission of radiation) can penetrate the skin to a depth of 10-15mm.

Magnetic Acupuncture combines conventional needling and magnetic stimulation. This method has anti-inflammatory and analgesic effects.

Auriculotherapy: There is a potential path physiological interrelationship existing between the external environment and various parts of the animals' body. When an organ or part of the body becomes ill, sensitive points (A-shi) may appear in relevant sites of the ear. Acupuncture treatment of these points for alleviation of illness and/or pain is called auriculotherapy.

ACKNOWLEDGEMENT

I wish to express my sincere appreciation to the Director and members of IMC for finding me worthy to attend the training on behalf of the Institute. I pray that God will continue to guide you and grant you the financial strength to send others as the opportunity arises.

REFERENCES

Yu Chuan (1992): Veterinary Acupuncture and Moxibustion.

Fang Su Fang (2003) Traditional Chinese Veterinary Medicine (Teaching notes).