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FORWARD

Research enhances technological break through that transforms a backward economy into a vibrant one. 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.2 is the second in the series and continues to focus on research activities conducted by staff.

For the period under review, Guest Speakers were invited to present papers on relevant areas that cover topics, other than core scientific subjects. These subjects include Management, Finance, Insurance, Retirement and Capital Market. This is in an attempt to carry along other categories of staff of the Institute and to facilitate linkage and collaboration with other local and international organisations. Also the introduction of modern Info-Technology gadgets such as the power point projector etc. not only enhanced and enriched Seminar Presentations but made our seminar more stimulatory.

Research in NVRI, has continued to be strengthened as is reflected in the quality of 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
2003/2004

Isolation and Characterisation of *Eimeria stiedai:* a Coccidium of Rabbits

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Introduction

Coccidiosis in rabbits may be caused by the ingestion of sporulated oocysts of *Eimeria* species. The disease is associated with intensive animal management and its spread is enhanced by unsanitary conditions, especially the contamination of feed and water by sporulated oocysts and is characterized by weight loss, diarrhoea and some mortality.

The coccidia of rabbits have not been studied to the same degree as the species which occur in other hosts in Nigeria. The isolation of pure cultures is rare. This has led to a dearth of information on the specific pathology of common rabbit coccidia. However the pathology of *E. stiedai* which is judged to be the most pathogenic of rabbit coccidia has been studied by some authors. Rabbits are found to be infected with more than one species of coccidia (Norton and Catchpole 1979; Peeters *et al.*, 1981; Ajayi and Umoren 1984). Ajayi *et al.*, (1987) and Ajayi and Umoren (1984) have identified several species of *Eimeria* in rabbits.

Rabbit production is becoming important as a substitute for beef and poultry, which have increasingly become expensive. The rabbit is also an important animal model for research. An understanding of coccidiosis in rabbits is therefore important in evaluating its effects on rabbit production and management.

The objectives of the study were to isolate *Eimeria stiedai* and to study its pathogenicity in experimentally infected rabbits.

Materials and Methods

Eimeria stiedai were isolated from the gall bladder of an infected rabbit at post mortem and passaged through a coccidia-free rabbit to multiply them. Standard salt flotation technique according to Ryley *et al.* was used to separate the oocysts from the aspirate and liver tissues. Sporulation of oocysts was done using 2.5% potassium dichromate. The oocysts were washed, counted, and stored at 4ºC until usage. Fourteen rabbits were used for the experiments after 3 weeks of conditioning during which the weight gain, PCV and possible oocyst passage were monitored. Eight were orally infected with 250,000 sporulated oocysts of *E. stiedai* and six were used as controls the same parameters (weight gain, PCV, oocyst passage, minimum sporulation time, patent and prepatent periods) were monitored until the termination of the experiments. Gross and histopathological findings were studied in infected rabbits and compared with controls.

Results and Discussion

The minimum sporulation time for E. stiedai was 43 hours at an average temperature of 26ºC. The prepatent period for E. stiedai ranged from 16-21 days. The weekly weight gain for controls was more than that of infected rabbits. The difference in total protein and packed cell volume values of control and infected rabbits did not appear significant [$P>0.05$]. The clinical signs observed in infected rabbits were anorexia, emaciation, weakness and prostration. Mortality was 100% in infected rabbits. The weight of liver of infected rabbits at post mortem differed significantly [$P<0.05$] from that of the controls. Grossly, the pathology was confined to the liver and gall bladder. The liver showed diffuse nodular lesions, which

on histological examination were due to the hyperplasia of the infected bile ducts. There was also massive fibrosis of the gall bladder epithelium.

Table I
Pre patent Period and Survival Times of Rabbits Infected with 250,000 Sporulated oocysts of *E. Stiedai*

Rabbits	Prepatent Period [Days]	Survival Times [Days]	Cause of Death**
A	17	25	Sub acute Hepatic Coccidiosis
B	18	29	Sub acute Hepatic Coccidiosis
C	16	29	Sub acute Hepatic Coccidiosis
D	19	33	Sub acute Hepatic Coccidiosis
E	16	42	Chronic Hepatic Coccidiosis
F	21	51	Chronic Hepatic Coccidiosis
G	ND*	-	Pneumonia
H	ND	-	Pneumonia
MEAN	17.8	34.8	

** The division into sub acute and chronic cases of hepatic coccidiosis depended upon the length of survival times of infected rabbits. Those with shorter survival times were judged sub acute while those with longer survival times exhibited chronic infections.
ND = Not Done.

The last two rabbits [G & H] died 4 and 13 days post infection, without oocyst discharge and on post mortem examinations were found to have acute pneumonia lesions.

Table II
Weights of Body Eviscerated Body and Liver of Infected and Control Rabbits

Infected Rabbits	Body Wt. At Death [G]	Weight Of Evis. Body [G]	Weight Of Liver [G]	Liver/Evisc. Body Ratio [%]
A	840	660	90	13.64
B	970	735	139	18.91
C	1220	890	137	15.39
D	730	530	91	17.17
E	1077	810	170	20.98
F	960	720	132	18.33
Mean	916.17*	724.17*	126.50*	17.40*
Control Rabbits	Body Wt. At Death [G]	Weight Of Evis. Body [G]	Weight Of Liver [G]	Liver/Evisc. Body Ratio [%]
1	1465	1005	36	3.58
2	995	705	25	3.54
3	1130	960	34	3.54
4	790	560	27	4.82
Mean	1095	807.50	30.50	3.87

*All means differed significantly from the controls [$P<0.05$]

Note
Only 4 of the controls were euthanized to compare with the infected rabbits. The oocyst count per ml of aspirated bile at post mortem ranged from over 900,000 to over one and a half million in infected rabbits.

In order to have a fuller understanding of coccidia organisms and their specific effects on animal hosts it is necessary to isolate them. The existence of cross immunological interactions between closely related species makes it necessary to evaluate the immunopathology of individual species and this in turn makes the isolation of the parasites imperative. Isolation is also necessary for the characterization of vaccine candidates which on the average must include 4 to 5 individual species in a single vaccine inoculum.

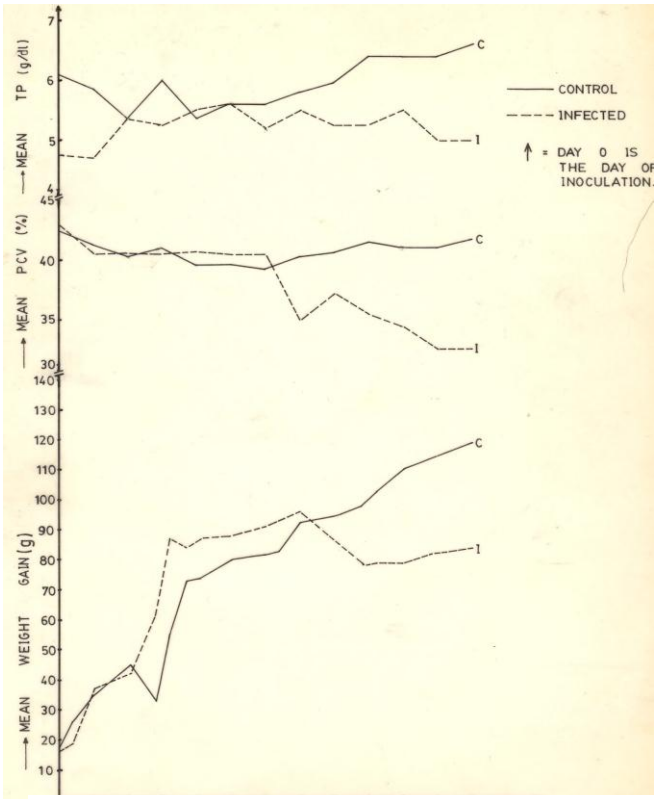

Fig. 1: Mean Total Protein, Packed Cell Volume and Weight Gain in sub acute cases of Hepatic Coccidiosis

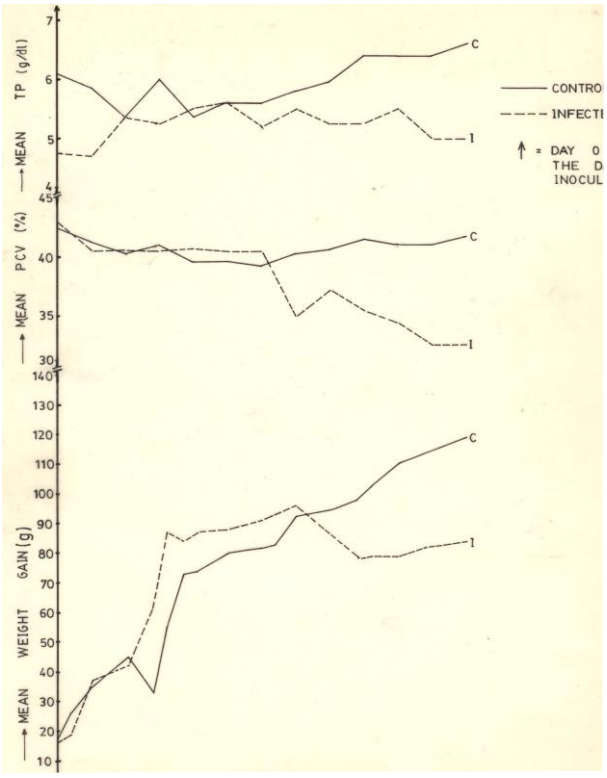

Fig 2: Mean Total Protein, Packed Cell Volume and Weight Gain in Chronic cases of Hepatic Coccidiosis

Acknowledgement
The author wishes to thank the Director National Veterinary Research Institute, Vom for the opportunity of presenting this work during the NVRI seminar series. The contributions of staff of the Department of Veterinary Parasitology and Department of Veterinary Anatomy, Ahmadu Bello University Zaria are also gratefully acknowledged.

References
Ajayi, S.A., Ajayi, A., and Ogunbiyi, A.O. (1987). Clinical Laprine Coccidiosis in New Zealand White Rabbits: An outbreak in Vom, Nigeria. Bulletin of Animal Health Production in Africa Vol., 36 pp 314-316.

Ajayi, J.A., and Umoren, N.A. (1984). The occurrence of coccidia of Eimeria species in caged rabbits in parts of Ibadan and Jos Nigeria. Journal of Science Education Vol., 1 pp 32-40.

Gomez-Bautista, M., Garcia, M.V., and Rojo-Vazquez, F.A. (1986).The Levels of Total Protein and Protein Fractions in the Serum of Rabbits Infected with E. stiedai. Annals De Parasitology Humaine Et Comp., 61: (4): 393-400.

Gomez-Bautista, M., Rojo-Vazquez, F.A., and Alunda, J.M. (1987). The Effect of the Host's age on the Pathology of E. stiedai Infections in Rabbits. Vet. Parasitology 24: 47-57.

Norton, C.C. and Catchpole, J. (1979). The species of Eimeria in rabbits for meat production in Britain. Parasitology Vol., 79 pp 249-257

Peeters, J.E., Geeroms, R., Froyman, R., and Halen, P. (1981). Coccidiosis in Rabbits: a field study. Research in Veterinary Science Vol., 30 pp 328-334

Ryley, J.F., Meade, R., Hazelhurst, J., and Robinson, T.E. (1976). Methods in coccidia Research, separation of oocysts from faeces. Parasitology Vol., 73 pp 311-326

The Identification and Structural Characterisation of the Active Acaricidal Principle in the Aqueous Stem Bark Extract of *Adenium obesum*

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Introduction

Adenium obesum (Forssk) is a shrub of the *Apocynaceae* family. The synonyms include desert rose (English), *Faux baobab* (French) and *Kariya* (Hausa). It grows mainly in the drier regions of Africa and is planted as an ornamental because of its attractive pink, red or white flowers. The aqueous macerate of the stem bark is used in baths for dermal infections, psoriasis and lice infestation (Burkhill, 1985). The root is pounded and used to stupefy fish. The aqueous stem bark extract is effective against various life stages of ixodid ticks (Mgbojikwe and Okoye; 2001a) and its mode of acaricidal action has been shown to be through the inhibition of total acetyl cholinesterase activity (Mgbojikwe and Okoye, 1998; 1999) as well as through interference with the electron transport chain of the tick (Mgbojikwe and Okoye, 2001b). The present work was aimed at identifying and characterizing, structurally, the active acaricidal principle in the aqueous stem bark extract.

Materials and Method

Both the whole stem bark and its aqueous extract were screened, using standard methods, for various phytochemicals and mineral elements. Based on the result obtained, the freeze-dried aqueous stem bark extract was subjected to bioassay guided fractionation using its anticholinesterase activity on cattle tick as a test model. The fractionation methods used include n-hexane precipitation; Sephadex G-25 column chromatography of the n-hexane precipitate using methanol, water and dimethyl formamide for elution; XAD-adsorbent column chromatography of the dimethyl for maimed eluate. The XAD - adsorbent eluate was subjected to both analytical and preparative TLC using silica gel-coated plates and ethylacetate - methanol water (81:11:11:8) as developing solvent mixture. The band with the highest anticholinesterase activity was then recrystallized several times from hot methanol and the pure crystal characterized structurally using melting point, some chemical tests, infra red spectroscopy and 1H-NMR (proton nuclear magnetic resonance) spectroscopy. The monosaccharide moieties were hydrolysed in acid and in alkali and the hydrolysates identified with paper chromatography using butanol-acetic acid - water (4: 1: 5) as developing solvent.

Results and Discussion

Results of the phytochemical screening showed the presence of resins, glycosides, tannins, flavonoids, saponins and the absence of alkaloids. The presence of glycosides and saponins is of interest. There are three common types of glycosides in plants - alkaloidal, saponin and cardiac glycosides. Since there is absence of alkaloids in both the whole stem bark and its aqueous extract, it is likely that the active principle could be saponin glycoside or cardiac glycoside

The mineral element analysis showed the presence of Na, Ca, Mg, Zn, Fe, Mn, Pb, Cu and P and the absence of Cd. The interest is on phosphorus which can be a component of organophosphate, the conventional antichlolinesterase agents are organophosphates and carbamates. However, in our earlier studies on kinetics of inhibition of acetyl cholinesterase activity of cattle tick with aqueous stem bark extract of Adenium obesum, we discovered that the inhibition is reversible and uncompetitive (Mgbojikwe and Okoye, 1999).The organophosphates are known to be irreversible inhibitors of Acetyl cholinesterase

activity. This leaves the possibility of the active principle being either a saponin glycoside or a cardiac glycoside and not an organophosphate.

Table 1: Phytochemicals in the Stem Bark of *A. obesum*

Phytochemical	Whole Stem Bark Extract	Aqueous Stem Bark Extract
Resin	+	+
Glycosides	+	+
Alkaloids	-	-
Tannins	+	+
Flavonoids	+	+
Saponins	++	++

Key: + = Present ++= Highly Present - = Absent

Table 2: Mineral Element Composition of the Stem Bark Extract of *A. obesum*

Concentration (mg/100g)		
Element	Whole Stem Bark	Aqueous. Stem Bark Extract
Na	63.50	57.20
Ca	76.50	178.70
Mg	11.00	11.10
Zn	61.60	60.70
Fe	65.40	73.50
Mn	31.20	36.10
Pb	8.0×10^{-3}	7.0×10^{-4}
Cd	ND	ND
Cu	2.40	2.50
P	17.--	112.00

ND = Not Detected.

Table 3: Acetylcholinesterase Activity Profile of Various Fractions of the Aqueous Stem Bark Extract

Method of Fractionation	Subfraction Obtained	Concentration (g/100g)	Enzyme Activity (Units/gm)	Inhibition (%)
Control	-	15.05	7.08 ± 0.95	0.00
Hexane Precip.	LP	9.54	6.85 ± 0.44	3.25
"	HP	4.68	1.27 ± 0.25	82.27
Sephadex G-25	AE	2.20	5.75 ± 1.06	18.79
	ME	1.08	4.88 ± 0.52	31.07
	DMFE	0.81	1.75 ± 0.15	75.28
XAD Adsorbent	-	0.75	1.63 ± 0.27	76.98
Prep. TCL	A	0.44	6.78 ± 1.02	4.24
	B	0.20	0.99 ± 0.15	86.68
	C	0.08	1.05 ± 0.20	84.39
	D	0.02	6.14 ± 0.81	13.29
	E	0.01	5.61 ± 2.07	20.76
Recrystallization of Subfraction B + C	-	1.52	0.98 ± 0.03	86.02

Key

LP	=	Lower Phase	HP	=	Hexane Precipitate
AE	=	Aqueous Extract	DMFE	=	Dimethyl formamide Extract
ME	=	Methanol Extract			

In the bioassay-guided fractionation, the hexane precipitate showed the highest inhibitory activity after drying. This further suggests that the active principles could be saponin or cardiac glycosides. The fractionation of the hexane precipitate on Sephadex G- 25 showed the dimethylformide fraction having the

highest anticholinesterase property. This suggests three possibilities. First, that the active principle is a small molecular weight substance of less than 1500 Daltons; Secondly, that it must have structural resemblance to dextran or containing monosaccharide molecules, and thirdly that it is an anticholinesterase compound. In the analytical and preparative TLC, two bands B and C, which on recrystallization, gave one RF value, gave the highest anticholinesterase activity out of the 5 observed. The solvent system-ethylacetate-methanol water (81:11:8) used in this experiment is commonly used in developing both saponin and cardiac glycosides.

The melting point of the recrystallized principle is 249 - 252^{O}C. In order to differentiate saponin glycoside from cardiac glycosides, some chemical tests were carried. The most important of these is Kedde test. This test will be positive for the presence of ά-lactone ring in a compound. Since the result we obtained was negative, it suggests the presence of saponin glycoside rather than cardiac glycoside. The IR spectrum has amongst other peaks, 840 cm^{-1}, (intensity 840>950>840 $^{cm-1}$) suggesting a spirostanol ring system. Also 3430, 840 cm^{-1} and 1700, 840 cm^{-1} suggesting C = O stretch in a steroid ring. The 1H-NMR spectrum showed four peaks at 2.35, 1.92, 1.48 and 0.89 with a proton ratio of 2:3:1:1, respectively, suggesting highly shielded protons common with steroid rings. The paper chromatogram of both the acid and alkali hydrolysate showed the presence of xylose, arabinose and rhamnose though there was resistance to acid hydrolysis, a phenomenon common with steroid saponins.

Conclusion

It is concluded that the active acaricidal principle in the aqueous stem bark extract of *Adenium obesum* is a low molecular weight steroidal saponin glycoside (< 1500 Daltons) with a melting point of 249 - 252 ^{0}C containing rhamnose, arabinose and xylose. It is possibly oleander glycoside.

Acknowledgement

We wish to acknowledge with thanks the Provost, Federal College of Animal Health & Production Technology, Vom for his interest in this work.

References

Burkhill, H. M. (1985). In: The Useful Plants of West Tropical Africa. Vol.1, 2nd Edn. Kew Royal Botanic Gardens. pp 135 - 136.

Mgbojikwe, L.O and Okoye, Z. S. C (1998). Kinetics of inhibition of acetyl cholinesterase activity of cattle ticks by aqueous stem bark extract of Adenium obesum. West Africa. J. Biol Sci. 8, 61-69.

Mgbojikwe, L. O. and Okoye, Z. S. C (1999). The anti cholinesterase properties of the aqueous stem bark extract of Adenium obesum. Nig. J. Biotechn. 10(1), 36 - 41.

Mgbojikwe, L. O. and Okoye, Z. S. C. (2001 a). Acaricidal efficacy of the aqueous stem bark extract of Adenium obesum on the various life stages of cattle ticks. Nig. J. Exptal. Appl. Biol. 2 (1), 39-43.

Mgbojikwe, L. O. and Okoye, Z. S. C. (2001 b). The effect of aqueous stem bark extract of Adenium obesum on the mitochondrial respiratory system of the cattle tick, *Amblyomma* spp. J. Phytomed. Therap. 6(2), 71-79.

Field Validation of a Monoclonal Antibody-Based Competitive Elisa for the Detection of Antibodies to Contagious Bovine Pleuropneumonia–II

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Introduction

An FAO/OIE/OAU Consultative Group on Contagious Bovine Pleuropneumonia held a meeting in 1998 and concluded that CBPP is the most important threat to the cattle industry in Africa. In 1998, under the Technical Co-operation Project (TCP), the FAO/IAEA introduced the competitive ELISA for the measurement of CBPP antibodies in a bid to improve the diagnostic abilities of laboratories in Africa including that of the National Veterinary Research Institute, Vom, Nigeria. Since then several reports have been presented in support of this effort. In a report of the Phase I of these validation tests, 480 sera samples comprising 120 from known infected herds, 240 from vaccinated herds with no history of CBPP and 120 from animals in endemic areas were tested (Chima et al 1999). They recorded c-ELISA test sensitivity of 96% and specificity of 98%. They indicated the advantages and preference for c-ELISA over CFT as test for determining the real prevalence of CBPP in Nigeria. The validation tests continued into the Phase-II.

In the last three years field work has become very difficult. The country was engulfed in civil and religious disturbances particularly in the Northern States. This made field trips and sample collection risky. Nomadic cattle owners resorted to treatment of their animals with Tylosin® instead of reporting the cases. Also the abrupt changes of technical and administrative hands in the Vom CBPP laboratory due to retirements/re-organizations, affected adversely the work and outputs of the laboratory.

Materials and Methods

A total of 720 blood samples were screened comprising of 570 from three infected herds in Lagos, Yola and Maiduguri and 150 from vaccinated herds without any previous history of CBPP infection in Plateau State.

Competitive ELISA

This test was carried out as described by LeGoff and Thiaucourt (1998) with a slight modification to ensure compatibility with the ELISA Data Interchange (EDI) programme of the International Atomic Energy Agency. Nunc Polysorb Plates (NUNC2-69620) were coated overnight at 4^0C with 100μl of lysed antigen diluted in PBS pH 7.4. Plates were washed once with the washing buffer (PBS diluted 1:10 in dilution buffer (PBS with 0.5% horse serum and 0.05% Tween 20) were incubated for 1 hour at 37^0C with moderate shaking. The plates were then washed twice and 100μl of conjugate was added to all the wells and incubated for 1 hour at 37^0C with moderate shaking. Finally, the plates were washed three times and 100μl of substrate (1-mM ABTS and H_2O_2 in citrate buffer) were added to all wells and incubated at 37^0C for about 15minutes with moderate shaking. Included in each plate were a strong positive serum control, a weak positive serum control, a monoclonal antibody control, a negative serum control and a conjugate control. The plates were read at a wavelength of 405 when the optical density of the monoclonal antibody control had reached 0.8 to 1.6. The plate reading and recording were monitored with the EDI Version 2.2 software connected to a multiskan reader.

Complement Fixation Test (CFT)
A total of 160 sera samples were screened using CFT. This test was carried out in a microplate plate as described by Regalla and Lefevre (1996) in the manual of the OIE. The reagents including antigen, complement, positive and negative control sera were supplied by the Onderstepoort Veterinary Institute of South Africa. 25μl of antigen was added to 25μl of serial dilution of inactivated test sera in veronal buffer. Then 25ul of complement was added to the mixture and incubated at 37^0C for 30minutes with vigorous shaking. Then 25μl of haemolytic system prepared by mixing equal volumes of 6% sheep red blood cells (SRBC) haemolysin was added to all the wells and incubated at 37^0C for 30 minutes with vigorous shaking. The plates were then centrifuged at 2000 rpm for 5 minutes before taking the reading.

Latex Agglutination Test
A total of 110 sera samples were tested using the White, Blue and Red beads according to manufacturers' instructions, 60 samples were from an uninfected herd in Plateau State and 50 samples from an infected herd in Lagos State.

Results and Discussion

c-ELISA Internal Quality Control
The results of the internal quality control of the ELISA plates tested are as given in Table 1. Four of the mean OD values of the monoclonal control and one mean PI of the strong positive and two mean PI of the weak positive outside the acceptable limits were probably as a result of faulty timing. However there was a problem with the conjugate control as quite a few of them were outside the limits.

Results of Serum Samples Tested by CBPP c-ELISA
Of the 720 samples screened, 18 were positive with ELISA while out of the 160 samples screened using CFT, 3 were positive.

Table 1: Results of Internal Quality Control Samples of CBPP c-ELISA

Test Plates	Mean OD CM + 1SD	Mean PI C++ +1SD	Mean PI C+ + 1SD	Mean PI C- + 1SD	Mean PI Cc + 1SD
3011901	0.954 +/-0.06	54.6 +/- 4.5	41.5 +/- 3.31	3.5 +/- 17.6	91 +/- 0
3011902	1.07 +/- 0.13	61.3 +/- 2.22	47.3 +/- 2.06	5 +/- 17.5	92 +/- 0
3011903	1.30 +/- 0.18	52.5 +/-1.29	48.3 +/- 4.79	4 +/- 17.6	75.5 +/- 0.70
3012201	1.09 +/- 0.06	70.6 +/-0.96	60.3 +/- 1.5	17 +/- 18.3	93 +/- 0
3012501	0.303 +/- 0.02	61.6 +/-0.5	56.3 +/- 0.5	12.5 +/- 17.7	75.5 +/- 0.70
3012502	0.305 +/- 0.01	64.3 +/-0.96	56.6 +/- 1.26	4 +/- 17.6	76.5 +/- 0.70
3012601	1.10 +/- 0.04	64.6 +/-9.9	59 +/- 5.6	7.5 +/- 17.5	89.5 +/- 2.12
3012602	1.14 +/- 0.04	68.3 +/- 2.06	59.3 +/- 2.5	9.5 +/-17.5	90 +/- 0
3012603	0.274 +/- 0.01	68 +/- 1.15	58.3 +/- 2.9	13 +/- 17.7	85 +/- 0
3012604	0.287 +/- 0.01	67.6 +/-0.96	55.3 +/- 5.2	4.5 +/- 17.6	83 +/- 1.41
3013001	1.10 +/- 0.15	70.3 +/- 2.5	56.8 +/- 10.4	3 +/- 17.7	90.5 +/- 2.12
3013002	1.27 +/- 0.03	75.3 +/- 0.96	66.8 +/- 4.4	20.5 +/- 17.0	89 +/- 11.31
3013003	1.09 +/- 0.10	73.6 +/- 1.89	63 +/- 3.9	-3 +/- 18.5	96 +/- 0
3013004	1.20 +/- 0.04	77.5 +/- 1.73	68 +/- 2.44	18 +/- 18.5	96 +/- 0
3013101	1.40 +/- 0.16	74.6 +/- 2.06	64.5 +/- 1.91	12.5 +/- 17.7	97.5 +/- 0.70
3013102	1.26 +/- 0.09	75.6 +/- 0.962	66 +/- 0.82	10.5 +/- 17.5	97 +/- 0
3013103	1.42 +/- 0.11	77 +/-1.15	64.5 +/- 2.89	11.5 +/- 17.7	97 +/- 0
3013104	1.25 +/- 0.05	71.5 +/- 3	61.3 +/- 3.20	20.5 +/- 19.0	93 +/- 0

Table2: Results of Latex Agglutination Test – Uninfected Herd (Vaccinated herd)

TESTS	NO. OF ANIMALS TESTED	AGGLUTINATION		
		-	+	++
White	50	40	20	0
Blue		24	5	31
Red		60	0	0

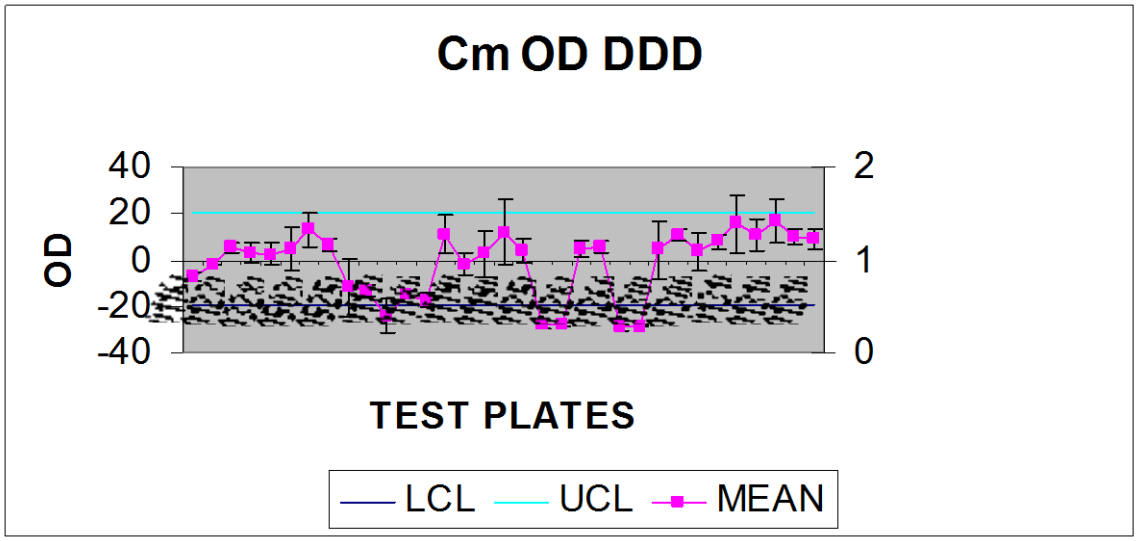

Fig. 1 Mean Cm OD values of CBPP c-ELISA tests carried out

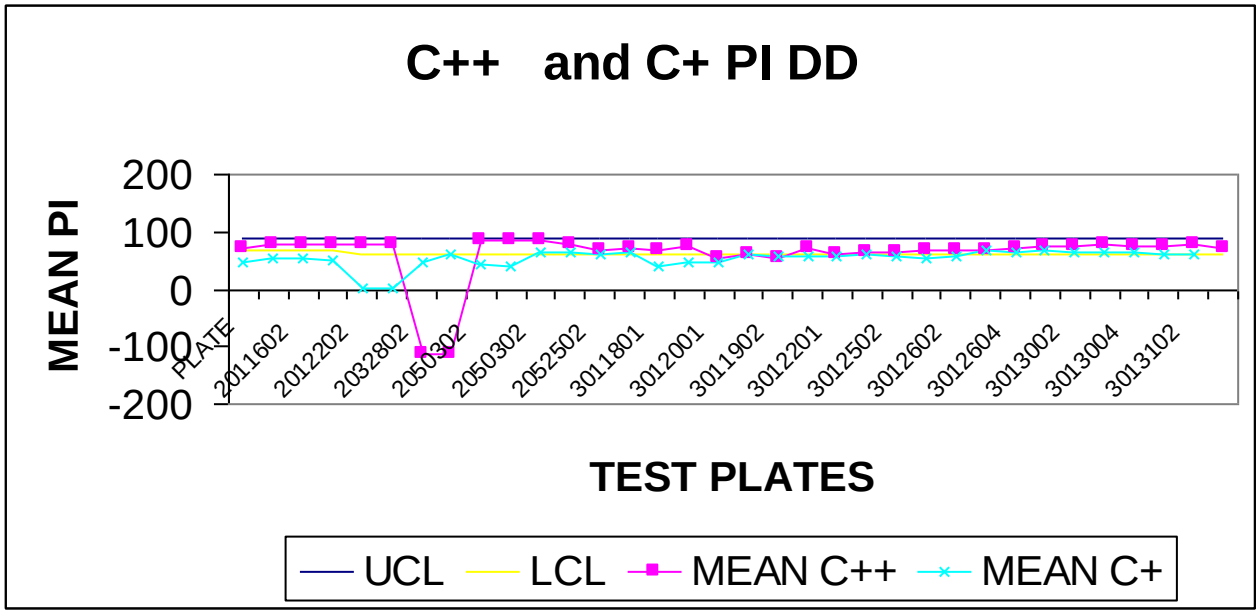

Fig. 2. Mean C++ and C+ PI values of CBPP c-ELISA test carried out

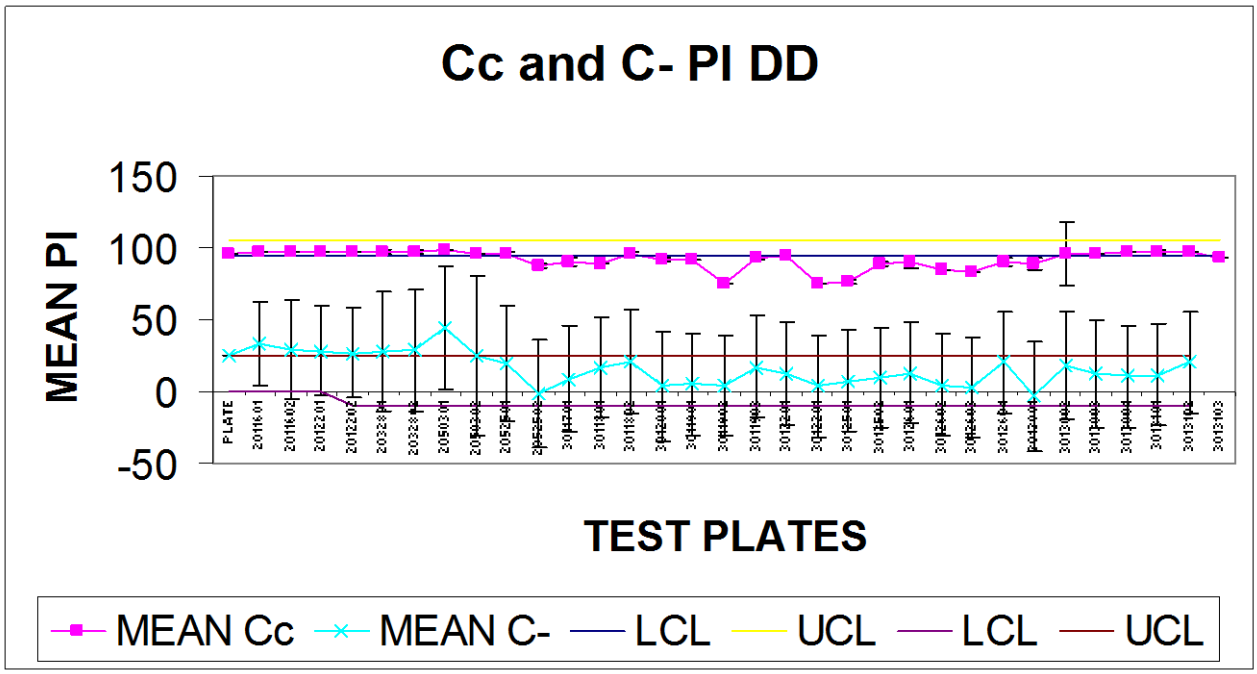

Fig.3. Mean Cc and C- PI values of CBPP c-ELISA test carried out

Relative Specificity with CFT

The relative specificity and sensitivity could be calculated from the two-sided contingency table

CFT

		POSITIVE	NEGATIVE	TOTAL
ELISA	POSITIVE	7	3	10
	NEGATIVE	0	150	150

Prevalence of CFT		0.44
Prevalence of c- ELISA	0.0625	
Rel. Spec. of CFT		100%
Rel. Spec. of c- ELISA	98%	
Sensitivity of c- ELISA	100%	
Sensitivity of CFT		70%

Latex Agglutination Test

There were problems encountered with this test mainly in the area of interpretation of results. The kit for the test was also not enough to conduct a significant number of tests.

Table 3: Results of Latex Agglutination Test – Infected Herd

TESTS	NO. OF ANIMALS TESTED	AGGLUTINATION		
		-	+	++
White	50	40	9	1
Blue		7	4	39
Red		40	10	0

The low number of samples screened was as a result of the unstable situation in the last two years; also data from previous works could not be recovered due to problems with the EDI programme. The results obtained showed that the c-ELISA is an efficient tool for the detection of antibodies against CBPP and also convenient because of its ability to screen many samples. The new kit provided by the EMVT makes the test even simpler by providing precoated plates and prepared reagents ready for use.

References

Chima, J. C.; Mohammed, A; Lombin, L. H. And Majiyagbe, K. A. (1999). Field validation of a monoclonal antibody-based competitive ELISA for the detection of antibodies to Contagious Bovine Pleuropneumonia. Proceedings, 2nd RCM of IAEA/FAO CRP on Monitoring of CBPP in Africa using ELISA, held in Lusaka, Zambia, 27 Sept- Oct. 1999.

Le Goff, C., Thiaucourt, F. A. (1998). Competitive ELISA for the specific diagnosis of Contagious Bovine Pleuropneumonia (CBPP) Vet. Microbiol. 60 179-191

Regalla, J., Lefevre, P. C. (1996). Detection of Antibodies to Contagious Bovine Pleuropneumonia. In: Manual for diagnostic tests and vaccine, OIE, Paris p. 723.

Contagious Bovine Pleuropneumonia: Current Situation and the Need to Develop a Control Strategy for Nigeria

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Introduction

Contagious Bovine Pleuropneumonia (CBPP), an infectious and highly contagious disease of cattle caused by *Mycoplasma mycoides mycoides* (SC) type, is still considered to be the most economically important cattle disease in Africa, causing greater losses in cattle than any other disease including rinderpest (Chima et. Al. 2000). The disease was present in most sub-Saharan countries and had not only reinfected countries like Uganda and Kenya but have also infected countries like Tanzania(1990) , Botswana (1995) and Rwanda (1995) which had been CBPP free (Nicholas and Bashiruddin, 1995).

The control of CBPP in Nigeria was probably achieved by 1965 following ten years of mass vaccination, well organized disease reporting, efficient laboratory diagnosis, effective quarantine and strict control of cattle movement. But this did not last long as the disease re-emerged a few years later perhaps from chronic carriers from one or all of the bordering countries of Niger, Chad and Cameroon.

In spite of an eradication campaign launched in 1970, outbreaks rose rapidly from 1986 onwards to a peak in 1989 when over 10,000 cattle were affected (Nwanta and Umoh, 1992). Alarmed by the situation, the FAO/OIE/OAU Consultative Group on Contagious Bovine Pleuropneumonia met for the first time in over twenty five years in October 1998, to discuss the deteriorating situation of the disease in Africa (Nicholas et. al., 2000). The meeting concluded that CBPP is the most important threat to the cattle industry in Africa. It was noted that the insufficiency of veterinary services which led to a lack of epidemiological knowledge, the inadequacy of control systems and regional coordination, and civil unrest contributed to the endemicity of CBPP on the African continent.

In 1998, under the Technical Co-operation Project (TCP), the FAO/IAEA introduced the competitive ELISA for the measurement of CBPP antibodies in a bid to improve the diagnostic abilities of laboratories in Africa such as the National Veterinary Research Institute, Vom. Since then several reports have been presented in support of this effort. However, the last two years has been a difficult period for Nigeria as various parts of the country were engulfed in civil and religious disturbances. The situation was even made worse by the nomadic cattle owners who, taking advantage of the breakdown in civil law would rather treat their animals with Tylosin® instead of screening them for fear of quarantine and slaughter of affected herds.

The Pan- African Programme for the Control of Epizootics (PACE) has commenced and will continue from where the TCP, FAO/ IAEA project for CBPP stopped.

Clinical Signs

There are considerable variations in the degree of symptoms seen in cattle affected with CBPP ranging from hyperacute through acute to chronic and sub clinical forms (Egwu, et. Al. 1996). The major signs being associated with respiratory stress (Scundamore, 1995), especially after exercise where a soft dry cough is evident. All ages of animals are susceptible but young animals develop joint swelling rather than lung infection.

Diagnosis

Effective CBPP Surveillance could be achieved in Nigeria through the Isolation and identification of the organism, and Sero-monitoring. Specimens from abattoir, clinical and suspected outbreak cases should be cultured and the organism isolated. Under the TCP- FAO/IAEA project on the sero-monitoring antibodies against CBPP, the c-ELISA Technique was validated and this should be used together with other serological techniques for the diagnosis of infection.

Culture and Isolation

The culture and Isolation of *Mycoplasma mycoides mycoides* (SC) in infected animals is necessary for the confirmation of outbreaks. It is also a requirement of the OIE for countries wishing request for the declaration of freedom from CBPP under the recommended standards for epidemiological surveillance systems for the disease (OIE, 1997). Nutritionally, the mollicutes are an extremely fastidious group of organisms, being dependent on their host for a large variety of organic nutrients such as vitamins, nucleic acid precursors, amino-acids, fatty acids and lipids (Nicholas and Bashiruddin, 1995), *Mycoplasma mycoides mycoides* (SC), is not a difficult organism to grow like many other fastidious *Mycoplasma* such as that causing Contagious Caprine Pleuropneumonia (Miles, 1992). Various media suitable for the isolation of the organism have been described (Freundt, 1983; Nicholas and Baker, 1998). The media should contain yeast extract (preferably fresh), and horse serum (10%). Several other components can be added, such as glucose, glycerol, DNA, L-cysteine and fatty acids, but the effects vary with the strains. To avoid growth of other bacteria, inhibitors, such as penicillin, colistin or thallium acetate, are necessary. The media can be used as broth or solid medium with 1.0-1.2% agar (OIE, 2003). Once the organism is isolated, it can be identified using biochemical tests (Al- Aubaidi and Fabricant, 1971).

Serology

Considerable advancement has been witnessed in serology since Campbell and Turner (1953) described Complement Fixation Test as the most important serological test for the diagnosis of Contagious Bovine Pleuropneumonia. Complement Fixation Test (CFT), the approved OIE test, although specific, lacks sensitivity and as such is inadequate for use as a mass screening test. Monoclonal antibodies against CBPP have been prepared and a competitive ELISA developed by the OIE collaborating Centre for the Application of Methodologies for the Diagnosis of Animal Diseases has been validated by the OIE reference Laboratory -FAO/IAEA, Austria (OIE, 2003).

CBPP in Africa

It is generally accepted that CBPP first came to Africa from Europe. But there are various schools of thought in relation to its spread in Africa (Davies, 1994; Egwu, 1996). Today, CBPP is endemic in much of sub-Saharan Africa and its incidence increasing. By the end of 1999, CBPP was present in at least 27 countries in equatorial, central and southern Africa although it is difficult to be certain due to the discrepancy between official and non-official reports (Robin, et. Al., 2000). The two main CBPP infection foci in west and central Africa are the Inner Delta area of Niger and the Lake Chad area. With the exception of countries like Senegal and Gambia in West Africa and Gabon and Congo Brazzaville in central Africa who are not declaring CBPP, all other countries are currently infected (FAO, 2000).

Current Situation in Nigeria

The picture of the disease in Nigeria is not different from that of the rest of Africa. The situation is compounded by the civil and religious unrest which engulfed the country recently. The nomadic Fulani were forced to flee from the central part of the country the area which was mostly affected by the unrests thereby spreading the infection even more. Recent studies suggest that CBPP is wide spread. Below are the results of studies conducted between February, 2002 and February 2003, in five states.

STATE	RATE OF INFECTION
Plateau	14%
Adamawa	6%
Borno	8%
Lagos	29%

Table 1: Rate of CBPP infection.

A need for the Development of a CBPP Control Strategy for Nigeria

Apart from the aborted JP -28 programme in West Africa, there has been no major systematic and well coordinated vaccination campaign against CBPP in Africa, as was the case for rinderpest (Tulasne, 1996). The main problems for control or eradication of CBPP are frequent occurrences of sub acute or symptomless infections and the persistence of chronic carriers after the clinical phase (OIE, 2003). The FAO/ OIE/ IAEA/ OAU-IBAR consultative group on CBPP recognized the very difficult task of eradicating CBPP. Although tools exist for the eradication of CBPP, the current political and socio-economic context in many African countries make it improbable that eradication can be achieved in the near to medium term (FAO, 2000).

The key to any successful strategy for CBPP control lies in the ability to identify the disease promptly and eliminate the foci of infection (FAO, 1977). The surveillance of an animal disease requires not only a way of diagnosing the disease but also the knowledge of the conditions for its transmission and also an efficient system for notification and for sounding the alert (Blancou 1996). An outbreak of CBPP requires the destruction of the entire herd thereby eliminating the tendency for further spread. However in a large country like Nigeria where the disease is endemic, stamping out is not physically or economically feasible. Other options may be considered. Quarantine coupled with vaccination is the most frequently used CBPP control measure (FAO, 2002). Even with this, modifications would have to be made to accommodate the diverse variations in the system of livestock farming in the different ecological zones of the country.

The northern part of the country especially the far north is a semi-desert area with two distinct seasons, rainy and dry seasons. This particularly encourages normadism as herdsmen who are mostly nomadic Fulani move to the Southern parts of the country where there is rainfall throughout the year in search of grass and water or concentrate along the banks of the river Niger and Benue or their tributaries. This movement across long distances and close concentrations at watering places ensures spread of the disease to different parts of the country. A campaign against CBPP should last for at least fifteen years to be effective. A strict restriction of cattle movement should be enforced and a compulsory yearly vaccination of livestock introduced.

A fifteen year campaign against CBPP could be divided into three phases:

Phase I

This would last for five years, during which vaccinations would be conducted twice a year to accommodate the short period of immunity conferred by the T1/44 strain of CBPP vaccine (Thiaucourt et. Al. 2000; Yaya et. Al 1999). Information on the disease profile would continue to be gathered through abattoir inspection, sero-monitoring and disease search. In areas of high endemicity, antibiotic therapy in combination with vaccination would be employed. As according to Thiarcourt, (2002). Due to wide spread use of antibiotics, the direct economical consequences of the reintroduction of CBPP to disease free areas would certainly be less severe today than it was during the last century. At this phase, slaughter and compensation would be employed in only areas considered to be reasonably free from infection.

Phase II

In the second five years, vaccination will continue to be emphasized, and the introduction of slaughter and compensation in any case of outbreak. Also at this stage antibiotic therapy would be withdrawn followed by mass sero-monitoring to root out infected herds.

Phase III
The last phase of the campaign will commence with the withdrawal of vaccination against CBPP and only imported animals would be required to be vaccinated. More attention should be given to border areas of the country. Monitoring should be strict to identify resurgent cases or new outbreaks. In cases of outbreaks, the organism should be isolated and characterized.

The following should also be considered in conjunction with an eradication campaign

- The creation of national grazing reserves especially in the north where inadequacy of grazing lands and water forces cattle owners southwards during the dry season.
- The reintroduction of cattle routes and provision of personnel to man the outposts in order to ensure that only animals certified to be duly vaccinated and free of disease are allowed to move from one place to the other.
- The identification of all cattle settlements and liaison with the local nomadic chiefs to ensure strict compliance with vaccination programmes.

Conclusions

The assertion by Dr. Provost in 1987 that "CBPP is an original disease, full of paradox whose history is parallel with the history of veterinary medicine and microbiology", is still valid today. It is surprising to note that since the discovery of the agent of CBPP over a century ago, total eradication is still elusive, more puzzling is the fact that this disease was eradicated from Europe using traditional methods, even before the organism itself was identified. However, the apparent dead lock on eradication seems to be responsible for the great advances made in the understanding of this disease today. Considerable improvements have been made in the Culture and Isolation of the organism, new and more sensitive serological test have been developed to replace the older ones which are less sensitive, and advances in immunological and molecular approaches have made diagnosis more accurate and timely. These tools have no doubt broadened our understanding of CBPP and may in the very near future shed more light on what strains of the organism we are dealing with and why eradication appears impossible in most parts of the African sub-region.

References

Al- Aubaidi J. M. and Fabricant, J. (1971). Characterisation and classification of bovine *Mycoplasma*. Cornell Vet., 61, 490-518.

Amanfu, W.; Masupu, K. V.; Adom, E. K.; Raborokgwe, M. V.; Bashruddin, J. B. (1998). Outbreak of Contagious Bovine Pleuropneumonia in Ngamiland district of north-western Botswana. Veterinary Record 143, 46-48.

Blancou, J. (1996). Early methods of surveillance and control for contagious bovine pleuropnuemonia. Rev. Sci. Tech. Off. Int. Epiz. 15 (4) 1263-1282.

Campbell, A. D. and Turner, A. W. (1954). Aus. Vet. J., 29, 154.

Davies, G. (1994). Contagious Bovine Pleuropneumonia. What every Veterinarian ought to know. State Veterinary Journal 1, 9-11.

Egwu, G. O.; Nicholas, R. A. J.; Ameh, J. A. and Bashiruddin, J. B. (1996). Contagious Bovine Pleuropneumonia: An Update. Veterinary Bulletin. Vol. 66. 876-888.
FAO, (1977).

FAO, (2000). Extract from the report of the Second Meeting of the FAO/OIE/IAEA/OAU-IBAR Consultative group on Contagious Bovine Pleuropneumonia. Rome, Italy, 24-26 October 2000.
Freundt, E. A. (1983). Culture media for classic *Mycoplasma*. In: Methods in Mycoplasmology, Vol. 1. [edited by Razin, S.; Tully, J. G.]. Academic Press, New York. P. 127-135.

Robin Nicholas, John Bashiruddin, Roger Ayling and Roger Miles (2000). Contagious bovine Pleuropneumonia: a review of recent developments. Veterinary Record. Vol. 70, No. 8, pg. 827.

Miles, R. J.; Wadher, B. J.; Henderson, C. L.; Mohan, K. (1988). Increased yields of *Mycoplasma* spp. In the presence of pyruvate. Letters in Applied Microbiology &, 149-151.

Nicholas, R. A. J. and Baker, Baker, S. (1998). Recovery of *Mycoplasma* from animals. In: *Mycoplasma* Protocols, Methods in Molecular Biology vol. 104. [edited by Miles, R.J.; Nicholas, R.A.J.]. Totowa, New Jersey; Humana Press. Pp. 37-44.

Nwanta, J. N. and Umoh, J. N. (1992). The epidemiology of contagious bovine pleuropnuemonia (CBPP) in northern states of Nigeria: An update. Revue d'Elevage de Medicine Veterinaire des Pays Tropicaux 45, 17-20.

OIE, (1997) Revue Scientifique et Technique: Office International des Epizooties 16, 898-904.

OIE, (2003). Contagious Bovine Pleuropneumonia, Manual of Standards. Chapter 2.1.6.

Scundamore, J. M. (1995). Contagious bovine pleuropneumonia. State Veterinary Journal 5, 13-16.

Thiarcourt, Francois (2002). Contagious Bovine Pleuropneumonia and Contagious Caprine Pleuropneumonia: Historical Review and Actual threat for European cattle. CIRAD-EMVT BP 5035, 34032 Montpellier, France.

Thiaucourt, F., A., Wesonga, Huebschle, O. J., Tulasne, J. and Provost, A. (2000).Contagious bovine pleuropneumonia. A reassessment of the efficacy of vaccines used in Africa. Ann. N. Y. Acad. Sci. 916, 71-80.

Tulasne, J. J., Litamoi, J. K., Morein, B., Dedieu, L., Palya, V. J., Yami, M., Abusugra, I., Sylla, D. and Bensaid, A. (1996). Contagious bovine pleuropneumonia vaccines: the current situation and the need for improvement. Rev. sci. tech. Off. Int. Epiz., 15 (4), 1373-1396.

Yaya, A., Golsia, R., Hamadou, B., Amaro, A. and Thiaucourt, F. (1999). Comparative trial of two vaccinal strains for CBPP, T1/44 and T1sr, in Cameroon. Rev. Elev. Med. Vet. Pays Trop. 52, 171-179.

Contagious Bovine Pleuropneumonia Control Programmes in Nigeria

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Introduction

CBPP is still considered to be the most economically important cattle disease in Africa, causing greater losses in cattle than any other disease including Rinderpest (Chima et. al. 2000). CBPP control was achieved by 1965 following ten years of mass vaccination, well organized disease reporting, efficient laboratory diagnosis, effective quarantine and strict control of cattle movement.

The Control Program code named JP 28 launched in 1971 was not very successful, as there was disease re-emergence perhaps from chronic carriers from one or all of the border countries like Niger, Chad and Cameroon (Nwanta and Umoh, 1992) Worried by this situation, the consultative group on CBPP, comprising the Food and Agricultural Organisation (FAO), International Office of Epizootics (OIE), and the Organisation of African Unity (OAU), held a meeting in 1998 to assess the impact of the disease and find possible means of curbing this resurgence. That meeting designated CBPP as the most important threat to the cattle industry in Africa.

Data on the infection in Nigeria is notoriously inaccurate and subjective (Egwu et al., 1996). In order to define a cost-effective control strategy for CBPP in Nigeria, knowledge of the disease prevalence is considered necessary

CBPP Projects at the National Veterinary Research Institute, Vom

In order to increase the diagnostic capability of the National Veterinary Research Institute, the Technical Co-operation Project (TCP), the FAO and the International Atomic Energy Agency (IAEA) introduced the c-ELIZA to Vom in 1998. Following this, Research Officers from the Institute participated in various training courses and workshops that took place in Nairobi, Kenya (18-22 June, 2001), NVRI Vom, Nigeria (16-22 Jan., 2003) and Bamako, Mali (10-21 February, 2003).

The IAEA Programme on the Monitoring of CBPP in Nigeria which started with the introduction of c-ELISA was followed by the Validation Test conducted in Vom. That programme was concluded in 2003. A report on the Validation results has already been presented to the I. A. E. A. The IAEA programme has currently been replaced by the Pan African Programme for the Control of Epizootics (PACE) which is a Programme based on Sero-monitoring and participatory rural appraisal. It is designed to monitor trans-boundary diseases one of which is CBPP.

NVRI Mycoplasma Research Laboratory

The Mycoplasma Research Laboratory is currently involved in several activities including the Monitoring of CBPP antibody levels in the national herd as a part of the ongoing PACE project; Assessing the efficacy of CBPP vaccines produced in Vom and the routine diagnosis of Mycoplasma infections. Results of routine diagnosis of samples from CBPP suspected cases brought to the Institute between June 2001 and February 2003 is presented in table 1.

Table 1: Prevalence of CBPP in four states in Nigeria

S/N	STATE	NO. OF SAMPLES	PERCENTAGE POSITIVE
1.	Plateau	447	14.11
2.	Lagos	66	28.75
3.	Adamawa	177	5.88
4.	Borno	26	7.5

The high prevalence of the disease in most parts of the Country designates CBPP as being endemic. It is surprising to note that the South which has low cattle populations tops the list on the prevalence rate. This is probably due to the fact that Lagos, being one of the most densely populated cities in Nigeria witnesses an influx of livestock from different parts of the country for slaughter, thus leading to a concentration of animals and showing this high prevalence. It is also possible that the stress induced by the long distance travel from the various parts of the country is responsible for initiating infection in lungers and those incubating the disease. It must however be stated that these samples were from suspected outbreaks and may not be representative of the results from a random sampling.

Major areas of concentration

Currently, major areas of interest in CBPP research include the failure of Strain T1/44 CBPP vaccine to control the infection despite continued efforts at eradication. The role of small ruminants if any in the propagation of this infection and the effect of antibiotics (Tylosin®) on CBPP are also of interest. Other areas are the determination of the various strains of *Mycoplasma mycoides mycoides* in Nigeria and the development of a genetically modified vaccine for the control of this disease.

The laboratory is currently limited by a number of factors, prominent amongst which is funding. Determining the true prevalence of CBPP in the various regions of the country will involve a lot of logistics. Sponsorship or grants would be required for such a project. There would also be a need to upgrade the facilities in the laboratory and to train the personnel in current laboratory techniques. It is also necessary to update the staff in current Molecular techniques, Immunology, biochemistry and pathogenesis of *Mycoplasma mycoides mycoides.*

Conclusion

The very high prevalence of the disease in Nigeria emphasizes the need to develop a CBPP Control strategy. What is required is a well equipped laboratory, trained personnel and the funds to carry out properly designed projects. A well coordinated national strategy and regional cooperation will make the task of eradicating CBPP realizable despite the failures of the Joint Project 28. Diagnostic and monitoring tools as indicated by the c-ELISA and Molecular techniques will play a major role in achieving this.

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References

Chima, J. C.; Mohammed, A; Lombin, L. H. And Majiyagbe, K. A (1999). Field validation of a monoclonal antibody-based competitive ELISA for the detection of antibodies to Contagious Bovine Pleuropneumonia. Proceedings, 2nd RCM of IAEA/FAO CRP on Monitoring of CBPP in Africa using ELISA, held in Lusaka, Zambia, 27 Sept- Oct.

Egwu, G. O.; Nicholas, R. A. J.; Ameh, J. A. and Bashiruddin, J. B. (1996). Contagious Bovine Pleuropneumonia: An Update. Veterinary Bulletin. Vol. 66. 876-888.

Nwanta, J. N. and Umoh, J. N. (1992). The epidemiology of contagious bovine pleuropneumonia (CBPP) in northern states of Nigeria: An update. Revue d'Elevage de Medicine Veterinaire des Pays Tropicaux 45, 17-20.

The Monitoring of Contagious Bovine Pleuropneumonia (CBPP) in Africa using Enzyme Immunoassay (ELISA)

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Introduction

Contagious Bovine Pleuropneumonia remains an important infectious disease of Cattle in Africa (FAO/OIE/OAU (1998). As a measure to tackle this deteriorating situation of CBPP and reduce the threat to cattle industry in Africa, c-ELISA was introduced to improve diagnostic ability of laboratories in Africa, Nigeria inclusive (TCP of FAO/IAEA 1998).

Series of Validation Test Projects for c-ELISA were organized in Africa in 3 phases between 1997 and 2003. The report of the 1st and 2nd phase of the project was presented and discussed at the second RCM in Lusaka, Zambia in September 1999 (Chima 1999).

The report of the 3rd phase of the project was presented and discussed at the Final RCM at Bamako, Mali February 2003 (Molokwu & Nwankpa 2003).

Objective of the Meeting

The objectives of the final Research Co-ordination Meeting were, presentation and discussions on results of serological tests on CBPP (CFT, c-ELISA, Latex Agglutination) by participating countries, to provide advice to PACE on diagnostic test/strategies to use for CBPP surveillance and to prepare document for publication as an IAEA TECDOC.

Presentations and Discussions

There were specially invited papers and Country Reports Presentations. Mali, Cote d'Ivoire, Ghana, Kenya, Uganda, Nigeria, Tanzania, Namibia and Botswana sent participants to the CRP meeting. After syndicate presentations and detailed discussions, the RCM made the following recommendations in respect of validation tests for the diagnosis of CBPP.

Competitive ELISA

There was lack of consistency of test results between laboratories, particularly with the old test format. The changes in the format introduced at a later stage of the project, improved repeatability and reproducibility of the tests. It was also generally observed that the supply of kits and reagents were adequate. The Internal Quality Control (IQC) gave good repeatability and reproducibility. The testing of sera in single wells is better as it does not affect diagnostic results, provided the IQC is within limit. The present software (EDI) should be changed because of difficulties encountered in its use. It was concluded that cELISA, is easy to use, robust and can be used on Haemolysed sera

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• Proceedings of the Final Research Co-Ordination Meeting (RCM) of the FAO/IAEA Coordinated Research Project (CRP). Laboratoire Central Vetenaire De Bamako, Mali 17-21st February, 2003.
The information, conclusions and suggested recommendations in this publication are yet to be ratified and approved by IAEA/FAO. The final resolution and recommendations will be published as an IAEA TECDOC.

CFT

Found to be common and well performed in most laboratories, but the only problem was that the reagents are not from one source. Repeatability and reproducibility was hampered by differences in quality of antigens and combination of reagents used.

The sensitivity of the CFT and cELISA were found to appear similar and the number of animals picked as positive depended on the stage of disease. CFT detects antibody to MmmSC earlier in infection and wane rapidly, while c-ELISA detects and persist for longer period (Result from Mali and Nigeria).It was also recommended that the specificity of a test should be estimated from disease free area (Namibia 100% specificity).

LAT (Latex Agglutination Test)

It was observed that the 3 LAT test (White, Blue and Red) gave highly variable results. Manipulation and laboratory conditions influenced the results. There is need for more precise SOP and inter laboratory comparisons and exchange of sera. New reagents are also required and there was a call for renewed Validation Tests since data collected so far are not enough for proper validation.

Recommendations

cELISA could be used as diagnostic tool for CBPP and should be adopted by OIE at some level of recognition as CFT. New software should be provided by FAO/IAEA. Regular monitoring of IQC results in the laboratories is necessary. Independent external quality control should be established at regional level to monitor data generated by different laboratories. It is important that the supply of kits should be from one distinct source and funds, be provided by National PACE programmes.

Each laboratory is to establish its own standard reference serum which should be calibrated against official OIE reference sera. SOP for CFT as screening test should be established and should be adopted by OIE. IQC data should be generated for CFT just as in cELISA and reagents to be provided in kit form for reproducibility and laboratory results comparison.

The Blue test was found to be unspecific. Further study on the White tests to confirm its specificity is to be carried out in CBPP free zone (Botswana). The Usefulness of Red test for detection of antigen in pleural fluid to be further evaluated. More precise SOPs to be developed for uniformity of test result in field and laboratory condition

Further recommendations and suggestions for Surveillance and Testing strategies for CBPP in different disease situations were made as follows:

Confirmation of outbreak

As cELISA and CFT detect antibodies to MmmSC at different stages of infection and the relative sensitivity of both tests is between 50% - 80%, both tests should be used to confirm outbreaks. In an outbreak situation sera should be collected from (15) clinically infected animals. Influence of antibiotics treatment on serological tests is to be investigated.

CBPP Enzootic Regions

Prevalence studies in enzootic regions by serology are to determine the proportion and distribution of infected herds based on cross sectional studies. Samples should be collected at least 4 months after last vaccination, since both tests can be influenced within the first 3-4 months of vaccination. Both tests (cELISA and CFT) are recommended for mass screening. But preference is to be given to cELISA which has better QC and is more suitable for mass screening.

Disease detection in buffer zones
There should be intensive vaccination in diseased area within buffer zones. Interpretation of results should take into account last vaccination time.

Disease detection in Surveillance zones
Abattoir, clinical and serological surveillance is recommended.
Early detection, disease confirmation and reporting are very important.

Surveillance in disease free zones
Clinical, abattoir surveillance and serological surveys is recommended

Clinical surveillance
This depends on the ability of veterinary services and herdsmen to identify suspect cases. Training for these persons on disease recognition/sample taking is a must.

Abattoir Surveillance
Mycoplasma isolation should be done to detect species in circulation. PCR could be used routinely to speed up detection and lung samples are better than nasal swabs.

Serological surveys
Regular surveys are necessary. It is also necessary to perform both tests (CFT and cELISA).

Monitoring of vaccination
This is needed to assess effectiveness and coverage of vaccination campaigns.
The meeting did not reach agreement on procedure but these suggested strategies were advanced: Branding of vaccinated cattle, Monitoring the reduction of clinical disease incidence and Monitoring the reduction in serological prevalence.

Further works suggested
Direct serological monitoring of vaccine markers (not yet available).
Monitoring of MmmSC antibodies induced by vaccination. Influence of antibiotics treatment on Serological test.

Suggested Responsibilities
It is suggested that diagnosis be confirmed by each country's Central Diagnostic Laboratory. Further confirmation should be by any of the 3 regional laboratories in Africa. Appropriate samples for CBPP (serum, lung, lymph nodes, and pleural fluid) should go in appropriate container, by the fastest means to National Laboratories. Samples from outbreaks should be sent also to regional laboratories. Report results of test without delay to DVS for early response to CBPP outbreaks. Confirmation of disease should be by reference laboratories and then be reported to OIE and neighbouring countries.

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References

Chima J.C., Mohammed, A. Lombin, L.H. Majiyagbe, K.A. (1999). Field validation of a monoclonal antibody-based competitive ELISA for the detection of antibodies to Contagious Bovine Pleuropneumonia. Proceedings, 2nd.RCM of IAEA/FAO CRP on Monitoring of CBPP in Africa using ELISA, held in Lusaka, Zambia, 27 Sept-1 Oct.

Le Goff, C., Thiaucourt, F.A. (1998) Competitive ELISA for the specific diagnosis of contagious bovine Pleuropneumonia (CBPP), Veterinary Microbiology, 60: 179-191.

Meat Processing to Sustain Population Growth: The Chinese–Nigerian Experience

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Introduction

Meat processing is a method of treating fresh meat which is a perishable commodity into a state or product that will be more stable, keep longer, add taste, variety and convenience of handling. Meat processing employs the use of mechanical means, temperature modifications, natural spices, chemical additives and packaging. China has been able to attain food security in animal protein supply through meat processing. Central to the animal protein supply in China is processed meat product diversification and the extension of shelf life. The result is the stimulation of meat product export, the development and sustenance of a large tourism industry, employment opportunities and affordable products for its teeming population. Meat when prepared from different regions of the world will normally have peculiar traditional flavours that add variety and taste and the products will differ in name and processing methods or technologies.

The Objectives of Meat Processing

Meat processing transforms raw meat by chemical or physical methods into value-added products. The purpose of the various treatments or processing includes the elimination of micro organisms that contaminate raw meat to ensure the hygiene and safety of the products. It also ensures the destruction or inhibition of enzymatic activities to prolong product shelf life, improve flavours to eliminate raw material smell which can influence taste directly and improve the product nutritional value through nutrient fortification and compensation for nutrient loss during processing.

Meat processing provides employment opportunities through the conversion of large meat supplies from livestock into meat products providing affordable products to the common man. It provides variety that satisfies various peoples taste

Techniques for Meat Processing

Curing

Curing is a method of preservation which improves meat flavour and colour. Basic ingredients used in curing are salt, sugar, nitrites and nitrates, baking soda and monosodium glutamate. Salt is the most important ingredient as it inhibits bacterial growth and spoilage, improves colour and water binding capacity. However when used alone salt gives a harsh, dry product. But the addition of sugar and nitrite overcomes these problems. Sugar enhances flavour by preventing the moisture-removal effect of salt from the meat giving it a good flavour. Sugar also retards bacterial growth but the very low levels used in curing meat will not have much effect on bacteria. Nitrites and Nitrates function in preserving the colour of lean tissues. They also inhibit micro organism growth. Meats preserved through curing include pickled, cured meat and air dried meat.

Smoking

In this method meat is cooked in a smoke oven or house. This is done to develop colour, preservation and the development of flavour. The common chemical in wood smoke is phenol which acts as an antioxidant. Other chemicals in wood add colour and flavour. Phenols also have bacteriostatic effect. Alcohol is also found in wood smoke and its effect is that it is also bacteriocidal. Hardwood is best for smoking. Liquid smoke preparations are available ready-to-use. This is applied directly on meat by spraying. Meat after pickling or boiling is processed with smoke, hot air, fire or dry heat at high temperatures resulting in smoked meat products including roast meat, bacon, smoked chicken, smoked pigs tongue etc.

Cooking
This is the application of dry or moist heat on meat. Cooking coagulates and denatures meat protein altering it=s solubility and effecting changes in colour. It improves meat palatability by intensifying the flavour and altering the texture. It destroys considerable numbers of micro organisms and improves the storage life of the product e.g. fried meat and stewed meat in seasoning.

The Meat Industry in Nigeria

The livestock and poultry population in Nigeria as at 1991 stood at cattle 13.95 million, sheep 22.1 million, pigs 3.4 million, donkeys 0.93 million, horse 0.208 million, camels 88,000 and 150 million poultry. The main meat protein in Nigeria comes from cattle. Other sources include sheep and goats, camels, pigs, poultry products, game (bush meat) dog meat, rabbit, fish and snails.

Cattle, sheep, goats and camels are imported from Niger, Chad, Burkina Faso, Benin, Cameroon and Sudan to augment the meat supply to the Nigerian public. It has been estimated that about 80% of the cattle are owned by the Fulani whose traditional occupation is livestock rearing. The traditional method of production is inadequate in meeting the national requirement because of the fast growing population. In the past the Federal Government of Nigeria established meat-processing plants in Mokwa and Bauchi to produce high quality beef. These plants had shops where fresh meat, chilled meat and meat by-products were sold. The companies also had ranches to supply the animals for slaughter.

Most livestock are slaughtered at either abattoirs or slaughter slabs. The sources of these animals are indigenous traditional livestock owners with smallholdings. Large-scale commercial farmers of small ruminants are rare. The same method of production and handling of products takes place with pigs, though pig production is at medium scale. Only private meat factories process meat into products such as fresh and chilled meat, where there is no damage of meat from slaughter to the table. Most meat is processed locally and sold out hot for local consumption. The meat is usually exposed to dust and flies, as mode of transportation and display for sale is inadequate. However meat is traditionally well cooked, roasted, grilled, boiled and fried prior to consumption thereby reducing the possible effects of hazards such as typhoid, paratyphoid, and shigellosis.

Prospects
Nigeria has very favourable environmental conditions that support all categories of livestock and a large livestock population which can be made more productive. There is a large land area to support livestock production and a livestock-producing culture. The multicultural composition of the country can support a diversity of meat products. The large population provides adequate market for meat products and the presence of livestock research institutions provide opportunities for research and development in the livestock and meat industry.

Constraints
The lack of land tenure pastoralists and the inadequate funding of the livestock sub sector for research towards breeding selection are serious constraints. The lack of consistent Government policies in livestock production and the low levels of technological adoption, skill, and equipment development for meat processing are also serious limitations. The poor management of project funds and lack of maintenance of facilities all need to be overcome.

Conclusion

The adoption of commercial meat processing technologies with the diversification of processed meat products which has sustained the Chinese population can sustain a growing population like Nigeria if adopted in order to meet the country’s animal protein requirements.

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References

Jing Ming L & Watanabe I. 2002. Development and Products of Chinese, Japan and Western Style meat products. (Training notes).

Xiaoling Q. 2002. Laboratory practice for Chinese and Western Style meat products. (Laboratory Training Manual).

Pasture Development for NVRI Laboratory Cattle

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Introduction

Pasture development is an essential complement of any ruminant livestock operation. The three aspects are seed production, fodder/forage production and fodder/forage utilization (consumption/preservation).

The initial objective of establishing the Pasture Development Unit was to convert the cattle paddocks into artificial pastures and consequently provide better quality forage for the laboratory cattle. Artificial pastures are defined as single specie or a mixture of two or more species of forage crops established on row cropland and the forage utilized as pasturage and or as harvested stored feed.

The total land area of the lab cattle range is approximately ten hectares. The entire area was reclaimed between 20th June 2002 and 20th July 2002. After reclamation, the existing paddocks were assigned identification numbers. Paddocks 1 (1.1ha), 3(1.8ha) and 5(2.5ha) were earmarked for immediate establishment. The two grasses available for expansion were *Bracharia decumbens* (Signal grass) and *Digitaria decumbens* (Pangola grass).

One Paddock was established into two equal sections of Signal and Pangola grasses while another Paddock was established into Signal grass alone. The existing Star grass (*Cynodon nleumfluensis*) in a segment of paddock 5 was rejuvenated. The establishment indices were 650m2 to 2.1 Ha, a transplanting ratio of 1:31 and 1,260m2 to 0.6 Ha, a transplanting ratio of 1:5 for Signal and Pangola grasses respectively.

On-field spoilage due to shortage in planting labour resulted in the low values for Pangola grass. The planting system utilized was the "rope spacing method" developed in Vom. All the planting materials were obtained from the seed bank at Dagwom farm.

Materials and Method

The grasses were dug from existing beds at the seed bank. At the paddocks, the grasses were further divided into smaller plantlets with roots and shoot intact. The lands composed of Eutrophic brown soils was ploughed and harrowed. PH values were 4.7, 5.0 and 5.2 for paddocks 1, 3 and 5 respectively. S.A. Ogedegbe developed the planting system in Vom, which involved spacing with ropes at required intervals depending on the terrain. The spacing of the planting holes varied between 30cm by 30cm and 30cm by 60cm across the fields. The planting holes were dug with hand hoes to a depth of 15cm. A plantlet was placed in each hole and then planted. Weed control was done manually as required. NPK 20-10-10 fertilizer was applied with a spinner broadcaster to paddock 5 in 2002 while Paddocks 1 and 3 were fertilized in the same manner in 2003. Economic evaluation of the paddocks was carried out using method used by Otysina, *et al*, (1987).

Results and Discussion

In 2002, 217 bales of star hay were harvested from the rejuvenated Paddock 5. Paddocks 1 and 3 were successfully established because 80% of the plantlets survived at the end of the 2002 rains.

The Agronomic evaluation of Paddocks 1 and 3, centred on seedling emergence and establishment and forage yield / botanical composition. In Paddock 1, Signal grass was rated 78%, volunteer star grass 61% and Pangola grass 28% while in Paddock 3 Signal grass was rated 72%. Overall biomass yield were 12,000kg/ha and 11,000kg/ha for Paddocks 1 and 3 respectively. The evaluation figures were peak

expectations, which reflected the intensive management, carried out. The fertilizer rates applied did not correspond to the relatively low rates recommended by Phillips (1977). However, this did not affect the yield adversely. Pasture grasses responded positively to fertilizer application. Okeagu et al. (1989) found positive linear responses for growth of tillers and overall yield of *Bracharia decumbens* at Nitrogen rates of up to 400kg/ha. In a 3-year study utilizing 7 levels of Nitrogen fertilization E.T. Pamo and R.D Pieper (1995), observed consistent increases in the yield of *Bracharia ruziziensis*. T.A. Phillips, (1977) stated that Nigerian pastures should be fertilized annually with 25-50 kg/ha of Nitrogen applied in two equal instalments and 50kg/ha of Phosphorous applied once every year or two to maintain good yields.

The economic evaluation was carried out for Paddock 1 alone. The financial inputs for the two years 2001/2002 totalled N120, 000 (One hundred and twenty thousand Naira). This amount was derived from the costs of reclamation, land preparation, extraction of propagates, planting, weed control, fencing materials and fertilizer application. The total output for Paddock 1 (N84, 000, eighty four thousand Naira) was derived from the Hay harvest in 2003 although grazing, silage and seeds are also possible outputs. The output value was the cost of 420 bales of Hay at N200 each. The negative difference in input and output N36,000 (Thirty six thousand Naira) in the first year is in agreement with published works (Otysina et al 1987) which suggest that positive returns for pasture establishment can be expected after 3-5 years. Overall, the grasses established are of very good nutritive quality. Signal and Pangola grasses recorded crude protein levels above 6% and mean metabolisable energy (ME) value of 2,138 Kcal/kg over 6 months of dry season (Nov.-April) in 2001/2002.

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References

Ogedegbe S. A. 2001. Pasture development and establishment at the N.V.R.I. Vom: A way forward. Unpublished.

Okeagu M.U., Asiribo O.E and Akinola J.O. 1989. Effects of Nitrogen application on growth characteristics of Signal grass (Brachiaria decumbens). Journal of Agricultural Science. Cambridge.

Otsyina R.M. vonKaufmann R.R, Mohammed-Saleem M.A. and Suleiman H. Manual on fodder bank establishment and management. Sub humid Zone programme, ILCA.

Pamo T. E. and Pieper R.D. 1995. Effect of fertilization and cutting frequency on the yield of Brachiaria ruziziensis. Germain and EVRARD in Adamawa Plateau-Cameroon. Tropicultura.

Phillips T.A. 1977. An Agricultural Notebook. Longman group. London.

Silage Production at NVRI Farm

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Introduction

A major constraint of ruminant production is the striking seasonal fluctuation in the quality and quantity of available forage plants (pasture and cereal crops). This can be reduced or completely eliminated by integrating forage conservation into the livestock feeding programme. Silage is a biologically preserved form of feed from forage crops, which is of vital economic importance in the livestock industry. If well prepared, it closely resembles the nutritive content of its original plant materials used in its conservation. Their feeding value depends on its digestible nutrient content, the knowledge, skill and attitude required in the process, its palatability and acceptability. The biological analysis of forage material used before and after ensiling helps in determining the quality of silage.

Silage is the preservation of green herbage of desired nutritional value in a fresh or wilted state, with minimal loss of quality (Akinola, 1990). It a moist, succulent feed produced as a result of controlled fermentation of fresh forage when stored in a silo under anaerobic condition. Over 80% of the feeding value of the original green materials is preserved in it if silage is properly prepared and preserved. Strategic planning before, during and after ensiling help in producing savouring silage for dry season feed-lot operation.

The idea of silage originated from some German and French farmers in the early 17th century. The extensive use of silage for beef cattle did not begin until about 1910 (Neuman and Lusby, 1986).

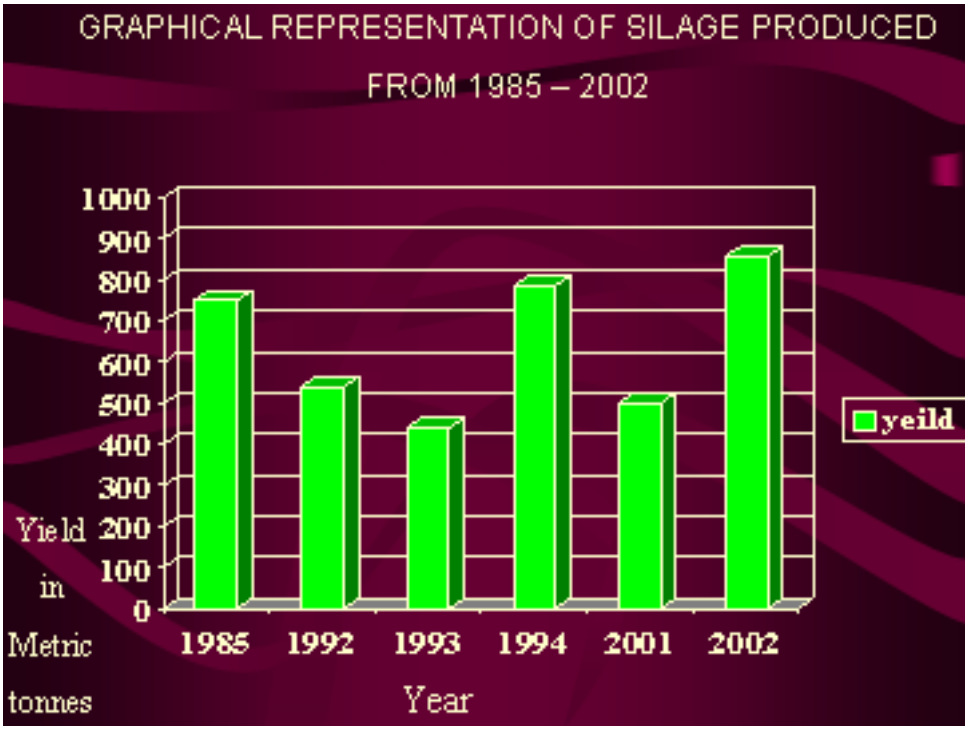
Silage making started in Nigeria at the National Veterinary Research Institute, Vom Stock Farm in 1959. Maize and Guinea crops were the first forage plants used and were very successful. Elephant grass was tested and found to be suitable. Kikuyu grass brought from Zaria, was also tested, but was not very good. Cassava plant brought from Ibadan was very bitter. Silage-making in Vom has continued up till today uninterrupted. Crops that have been found to be suitable in Nigeria are Maize, (*Zea mais*), Guinea corn (*Sorghum bicolor*), Bulrush millet (*Pennisetum americanum*), Guinea grass (*Panicum maximum*), Gamba grass (*Pennisetum purpurium*), Rhode grass (*Chloris gayana*), Cowpea (*Vigna ungulate*), Mucuna bean (*Stizolobium dearingianum*) and Soya bean (*Glycine maximum*).

Methodology

Silage-making begins around the last week of August and or first week of September, depending on the rainfall pattern and involves land preparation, to planting, weeding, fertilizing to the dent or milking stage of maize cobs, with the stalk and leaves still green. The most critical stage in silage making is the ability to convert the technical aspect of this operation through fermentation. Between 30, 60 – 90 days, fermentation proceeds under anaerobic condition with the release of *Lactobacilli*, which help in converting sugar (carbohydrate) into lactic acid. This process is necessary for preventing the action of undesirable *Clostridial* bacteria which can spoil the entire process by causing decomposition. This lactic acid, in association with other acids (acetic, formic and proprionic) help to preserve the fermented silage throughout the utilization period.

During this period, up to the final stage when silage is ready for consumption, there is a release of oraganolettic aroma (likened to over ripped mango fruits) into the atmosphere. There is also a release of fluid which changes to black midway into the process and finally stops at the completion of the cycle. These are indicators of well prepared silage. It is this offensive aroma that attracts ruminant animals to the site of the silo.

Good compression, the action of bacteria yeast, moulds and enzymes and the use of a fermentable carbohydrate which acts as a source of lactic acid are necessary for the breaking down of the required acids (acetic, lactic, propionic and butyric) which help in the preservation of silage. The most important points in the bacteria control of silage are the need for a fermentable carbohydrate to act as a source of lactic and the power of lactic acid to withstand acid conditions in the mass. The whole success of silage making depends upon these facts and it is only when they are realized that spoilage and losses due to bacterial action can be minimised. Additives are added to improve the quality where there are lapses in the process.



Good silage must present acceptable aroma and must remain greenish-yellowish, devoid of mould and be neither slimy nor rotten. A dark brown colour in silage indicates excess heat or high water content. Black colour shows that the material is rancid. These must be avoided so that efforts, time and resources are not wasted

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References

Akinola J. O. (1990). Bulletin on Forage Production and Conservation**.** Department of Animal Sciences, Faculty of Agriculture, ABU, Zaria.

Anderson, M. J., Fries, G. F., Kopland, D. V. and Waldo, D. R. (1973). Effect of cutting stage on Digestibility and Intake of harvested Alfalfa Crop. Pp. 200, 250, 270.

Bailey, R. W. (1973). A chemistry and Biochemistry of Herbage, Vol. Academic Press pp. 178.

Neumann, A. L. and Lusby, S. K. (1986). Beef Cattle (8th edition). Wiley New York.

Warson, S. J. and Nash, M. S. (1960). Conservation of Grass pp. 153, 167 Forage Crops. Oliver Boyd Edinburgh.

Cattle Improvement in Nigeria: The Artificial Insemination Techniques (AIT) Option.

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Introduction

Artificial insemination (AI) is one of the most important developments that have occurred in the dairy industry since the 1930s. It has made a major contribution to the industry by markedly increasing the genetic potentials of dairy cattle. The basic objective of A.I .is to extend the use of sires that possess desirable characteristics that can be used for the genetic improvement of animals. As a powerful innovative tool for genetic manipulation, it greatly facilitates rapid research and breeding activities. Currently methods have been developed for inseminating cattle, sheep, goats, swine, horses, dogs, cats, poultry and a variety of laboratory animals, insects and human (Voh (Jnr.), 1992).

Artificial insemination in cattle has many advantages one of which is the extension of the use of good sires. A bull used naturally twice a week can breed approximately 100 cows per year. If the same bull is used in A. I. and collected twice weekly, the semen from each day's collection can be diluted, frozen and used to breed approximately 260 cows. If all of the semen is used, one bull can breed approximately 27,000 cows per year (Schmidt and Vanvleck, 1973). It also has advantages of reducing the incidence of diseases such as Brucellosis, Vibriosis, and Trichomoniasis etc as well as reducing the cost of keeping many bulls in a farm (Schmidt and Vanvleck, 1973).

The focus of this paper is on cattle improvement in Nigeria through A.I. It is an exposition of the advantages of AI over natural mating as well as its procedures for cows.

The process involves the collection of semen from the male and after processing it is deposited into the reproductive tract of the female at oestrus (heat) by the use of instruments such that there is no direct physical contact between the male and the female (Schmidt and Vanvleck, 1973). The recto-cervical, has been the most widely used technique. To achieve success in A. I., semen must be collected, processed, preserved and properly deposited within the tract of the cow at the best location and at the best time to enable spermatozoa to meet an ovum. The time of insemination is usually between the middle and end of oestrus (heat) referred to as the AM/PM rule. The owner must therefore pay more attention to his herd, detect oestrus and report to the inseminator.

Historical Background

Artificial Insemination (A.I) is a relatively old technique. The first recorded information on A.I. dates back to1322, when an Arabian chief successfully obtained semen from a rival chief's stallion and artificially bred his own prize mare. The first A.I. society in the United States was established in New Jersey in 1938 and was followed by the establishment of one in New York. In the late 1940s British research workers found that spermatozoa could survive and were fertile after freezing and thawing. Glycerol had to be added to the extender.

In Nigeria, the first documented A.I. was carried out at the Livestock Investigation Centre (LIC), N.V.R.I. Vom in August, 1949, where semen from white Fulani bulls which had come from the Agriculture Department Farm, Shika, Zaria, was used. In 1976 the National Animal Production Research Institute (NAPRI), Zaria received a national mandate to service all states of the federation with A.I. programmes, import and distribute semen to farmers and train inseminators. From 1976 to1989, a total of 5002 recorded inseminations were carried out by NAPRI nationwide (Von Jnr., 1992).

Methods of Semen Collection

There are three main methods of collecting semen from a bull; Use of an Artificial Vagina (A.V), the use of Electro-ejaculator (E.E) and by rectal massage of accessory genital organs. The use of A.V. is the most practical and satisfactory means of collecting semen. The collection of semen by the use of the Electro-ejaculator and rectal massage are useful in that they provide means of obtaining semen from bulls that cannot mount or from bulls that for some reason will not mate either naturally or with A.V.

Semen Evaluation, Processing and Storage

The semen are examined grossly and microscopically to determine their motility and quality. Semen evaluation provides significant information on complex sexual functions of an animal. After evaluation, semen is process for use in either liquid or frozen form. Semen processed for use in the liquid form is diluted with egg yolk citrate extender. Semen processed for use in the frozen form on the other hand is extended with egg yolk-citrate solution with glycerol at a final level of 7.0 to 7.6% to protect the sperm during the freezing process. In both forms antibiotics are added to inhibit bacteria and to destroy disease organisms. Many commercial operations use Liquid Nitrogen, which has a temperature of –196^{o}C and the semen can remain viable for up to 25 years.

Insemination Techniques

There are three major insemination techniques in use:
Speculum method for ewes and does.
Recto-Vaginal or Recto-cervical in cows
Vagino-cervical method in mares.

Insemination Procedure for Cows

1. Wear protective clothing, shoulder high disposable gloves and rain boots
2. The cow or heifer is restrained to prevent injury.
3. Load the insemination pipette (Liquid semen) or insemination gun (Frozen semen).
4. Lubricate gloved hands with soap and water.
5. Carefully insert the lubricated gloved hand into the rectum and evacuate faeces if present and thoroughly clean the vulva.
6. Identify and grab the cervix (Land mark structures).
7. Press the forearm gently downwards to compress the vulva thereby dilating it partially.
8. Insert the pipette or gun into the vulva at an angle of about 45^{0} with the tip directed cranially and dorsally into the vulva and along the vaginal wall.
9. Guide the gun or pipette into the external cervical opening with the aid of the thumb and index finger; note the gritty texture of the cartilaginous cervical rings.
10. Combine gentle forward pressure on the gun with manipulation of the cervix by rotary movements of the wrist until the desired extent of penetration is achieved e.g. body of the uterus.
11. Deposit semen slowly with the gun or pipette fixed in the desired position.
12. Carefully withdraw the gun, give the uterus gentle massage and then carefully withdraw the arm.
13. Dispose of gloves and straws carefully and record the insemination.

Areas of Application

Artificial insemination (A.I) has proved to be a useful method to rapidly improve productivity of cattle in many parts of the world (Salisbury et al, 1978, Voh, 1992). It can be used to revolutionize Nigeria's Livestock industry by collecting, processing and storing semen from proven sires in Liquid Nitrogen, which abound at L.I.D and making the semen available to farmers at a reduced price. This will reposition N.V.R.I., as a foremost A.I. centre.

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References
Ewer, D.W and Hall, J.B. (1978) All Nutrient Requirements. The Interrelationship of Organisms. Eco. Bio 2: 333-337

Salisbury, G.W; Van Demark, N.L. and Lodge, J.R. (1978). Physiology of Reproduction and A.I in cattle. Freeman Company. San Francisco, U.S.A. 386 – 390.

Schmidt, G.H. and Vanvleck, L.D. (1973) Principles of Diary Science. Freeman Company. San Francisco U.S.A. 439 – 467.

Voh, A.A. (Jnr.) (1992) Artificial Insemination in Farm Animals. In A.I. Training manual, NAPRI, Shika. 64 – 74.

Veterinary Public Health and Food Safety

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Introduction

Veterinary Public Health (VPH) has been defined by the World Health Organization as that component of public health devoted to the application of veterinary skills, veterinary knowledge and veterinary resources for the protection and improvement of human health. Veterinary Public Health is widening the conventional field of meat inspection and hygiene, adopting a more holistic approach. Aspects dealing with food-borne pathogens, residues and environmental contamination from farm level up to the consumer are all part of VPH.

Next to food security is the subject of 'Food Safety'. That is safety that begins at farm level. Thus, "safe from farm to fork" or "stable to table" According to the Codex Alimentarius Committee on food hygiene (1995), safe food has been defined as food that does not cause harm to the consumer when it is prepared and or eaten according to its intended use. Thus food safety aims at protecting public health by preventing, eliminating or significantly reducing the prevalence of food-borne hazards (NASDA, 2003).The effective prevention and control of outbreaks of zoonosis, food-borne diseases and intoxications with food of animal origin requires effective VPH to identify both the origin and causes of hazards.

The need for food safety is predicated on the fact that the world has become a global village particularly in the area of trade and that is linked to food safety. Nations are on the alert on risk factors associated with imported food. Exporters know that buyer's confidence in the safety of a food commodity is an essential ticket to success in the International marketplace (Taylor, 2003).

Risk Factors associated with VPH and Food Safety

Intensified livestock production system increases Zoonotic infections and increased interface between animal and man through intensified peri-urban livestock production increases Zoonotic infections. Changes in feeding practices for livestock (BSE, *S. enteritides*, drug and pesticide residues), ecological changes such as irrigation/deforestation that affect situations around farmed animals with increases in vector borne infections and increased interface between wildlife, livestock and man respectively are all risk factors for food safety. Inadequate thawing prior to cooking, inadequate temperature control after cooking, contamination of cooked, safe food with microorganisms, political instability, armed conflict, animal movements and consumption of diseased animals are all risk factors. Transhumance also causes animal health problems and challenges for VPH.

VPH and Food Safety Problems

The diagnosis, prevention, control, eradication, monitoring and surveillance are good activities that ensure animal health and prevent animal diseases transmissible to man. Recent Zoonotic diseases of great importance include Npah virus the cause of febrile encephalitis and death in humans, Rift Valley Fever which causes death in humans, abortion and death in cattle, sheep and other livestock, Bovine Spongiform Encephalopathy (BSE) the disease that causes death in cattle and NV Creutzfeld-Jacob disease in humans. Others include Anthrax, Crimean Congo Haemorrhagic fever, brucellosis, tuberculosis, rabies, etc. These conditions are still major VPH problems.

Emerging Food Borne Diseases

There are some emerging food-borne diseases which constitute serious public health hazards. These include; *Salmonella enteritidis* and *Listeria monocytogenes* of poultry from improperly cooked meat and

vegetables. *Campylobacter jejuni* and *Escherichia coli* 0157:H7 from poultry. Others are antibiotic resistant *Salmonella typhimurium* DT104 and *Shigella* which cause diarrhoea, vomiting and fever.

Environmental Hazards

The need to protect the public from environmental hazards of chemical, physical and biological origin through monitoring, surveillance, epidemiological evaluation and formulation of effective laws and regulations cannot be overemphasized. The control of zoonosis of environmental origin e.g. rabies from wildlife, *Salmonella* from water contaminated with effluent are very important. The safe disposal of carcasses, condemned meat and other wastes will reduce environmental hazard. Pollution of the environment with radioactive materials (e.g. Caesium, Strontium, etc), metallic remainders (e.g. Cadmium, Mercury, etc) can constitute hazard to the public (Carvajal, 2003). Other important problems include presence in meat or milk of residues of antibiotics, chemical agents (e.g. pesticides and disinfectants), hormones; naturally occurring toxins [e.g. Solanine of potato] and feed additives. These are hazards and are of public health significance.

Food Safety Assurance

It is now generally recognized that attempts to control zoonosis encountered from food of animal origin (Beef, poultry, pork, milk and eggs) with the traditional detection inspection microbiologically are ineffective and inadequate in preventing contamination of foods with microbes of current concern (Prucha,1977). OIE reports show increased prevalence of food borne diseases such as Salmonellosis, Campylobacteriosis, verotoxigenic *E. coli* infection, cryptosporidiosis, etc. Public health workers now emphasize that safe food products can only be supplied to the consumer by relying on process control which elaborates good manufacturing and distribution practices. The process control chain is from stable to table i.e. control at the production facility, control on the way to the slaughterhouse/factory, control in the slaughterhouse/factory, control on the way to the shops and control in the shops. The application of food safety with a process control component is provided by such systems as the Hazard Analysis Critical Control Point (HACCP).

HACCP

This is a food safety management system which aims at identifying hazards, assessing human exposure risks and establishing priorities as regards measures for control. It is a preventive system of quality control. When properly applied, the system can be used to control any point in the food production chain where contamination can occur. Other effective food safety management systems are Good Hygienic Practice (GHP), International Standard Organization (ISO) etc.

Veterinary Public Health in Nigeria

Major diseases affecting livestock include Brucellosis, CBPP, Tuberculosis, Trypanosomiasis, and Tick borne diseases,(cattle and sheep), cowdriosis, PPR and helminthiasis, PPR, Orf, Cysticercosis and cowdriosis, (goats), African swine fever, Trypanosomiasis and mange (pigs), Newcastle disease, IBD, Mareks and coccidiosis (poultry).

Zoonotic Diseases

Diseases of animals that are of public health significance in Nigeria are numerous. They include brucellosis, Salmonellosis, cryptosporidiosis, shigellosis, cysticercosis, Campylobacteriosis and tuberculosis. Others are rabies, anthrax, hydatidosis and Listeriosis.

Main Food Safety Problems

Food safety problems in Nigeria include biological conditions (e.g. Ecchinococosis, Cysticercosis, Trichinellosis, Mycotoxicosis, Brucellosis, Staphyloccocosis, Listeriosis, Shigellosis, Salmonellosis, etc), Antibiotic residues and Chemical residues

Role of VPH Veterinarians

Services rendered by VPH Veterinarians in Nigeria include animal disease diagnosis, surveillance, monitoring and reporting, Zoonotic disease prevention, control and eradication, Food and meat hygiene by ante mortem and post-mortem meat inspection. Others are public awareness on vaccination against zoonosis and control of animal import.

Constraints to VPH

There are many factors militating against effective VPH in Nigeria. These includes; lack of manpower, lack of laboratory facilities, lack of Consumer education, drug abuse, and lack of adequate food safety legislations. Others are inspirited application of available laws, insufficient control of animal/Animal products importation and poor government funding of VPH and food safety programme.

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References

Carvajal, R. J. F (2003). Systems HACCP in the search of the total quantity from the field to the tourism or the export. X1 International Congress in Animal Hygiene, February 23-27, 2003, Mexico City, and Vol.2

Hodges, J and Boyazoglu, J. (2003). Food Hygiene, Proceedings of the International Congress in Animal Hygiene, Vol.1, 23-27th February 2003, Mexico, Pp 19-29

National Association of State Department of Agriculture's Food Regulation and Safety Policy (2003) Food Regulation and Safety, Pp 1-14

Prucha, J.C (1977). HCCP and Food Safety: End Product Control versus Longitudinally Integrated Quality Assurance, World Congress on Food Hygiene, The Hague, P.14

Taylor, M.R (2003). Food Safety 1977: Driving Forces and Emerging Trends. Council for Agricultural Science and Technology, Pp 1-7.

Participatory Epizootiology; a Tool for Research

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Introduction

Livestock in traditional societies have different values for different members. This implies that the importance of disease in such societies is a complex issue. Livestock farmers have existing indigenous veterinary knowledge about breeds, disease prevalence and occurrence and health management which should be taken into account by researchers.

Participatory Epizootiology (PE) is an effective tool for gathering information with the full participation of farmers. This method evolved from several sources and traditions; involving activities, participatory research, agro-ecosystem analysis, applied anthropology, field research on farming systems and rapid rural appraisal.

Epizootiology

This deals with the study of all factors that contribute to the occurrence, control, distribution and prevention of disease in livestock populations

Participatory Epizootiology (P.E.) is a timely and action-oriented process of disease investigation which empowers farmers to participate in data collection and disease control strategies that will be acceptable to them. This can be achieved through good interaction, which determines the level of relationship and trust between researchers and the local people. This will have effect on the types of issues and information the people will be willing to discuss. It helps to establish the evidence of disease occurrence and epizootic cycle.

Participatory Epizootiology can be divided broadly into two, exploratory and topical. Both have the advantages of information gathering which can be used to design better animal health projects, conduct better disease surveillance, have accurate analysis of data and design appropriate intervention strategies acceptable to the farmers.

The methods employed in participatory Epizootiology are based on simple principles aimed at studying the many variable factors that create the problem to avoid massive measurement errors in intelligence gathering. The reliability and validity of data is much dependent on the rapport between researchers and livestock farmers.

When conducting participatory Epizootiology a team has to be formed, communities and areas identified, background and decision making structures obtained and the map of the area drawn. The success of the team will depend on their attitude and behaviour to farmers.

P.E has the advantage of being a good method of gathering data from remote areas. It is cheap, more feasible and results are available and immediately verifiable. P.E. is flexible and is an effective method for designing conventional studies, the knowledge and skills of local people are used in data collection, analysis and surveillance. It is gender sensitive, a powerful tool for empowerment and is participatory rather than extractive. Data analysis can be carried out using any of iterative, participatory, quantitative or statistical analysis.

P.E can augment and strengthen survey by establishing rigorous and systematic basis for selecting qualitative criteria for designing and interpreting survey data, gives first hand intelligence for stratification and sampling frame, provides for formulation of better hypotheses and questionnaires. In addition P.E. is a useful tool in animal health monitoring and evaluation. It can be used to track changes in disease impact overtime and also to collect perceptions of the beneficiaries and other stakeholders on the impact of the project, weaknesses and possible ways to improve performance.

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References

Catley, A. (1999). Methods on the move: A review of veterinary uses of participatory approaches and methods focussing on experiences in dry lands of Africa. Publishers International Institute for Environment and Development, 3 Endsleigh Street, London WC1H 0DD, UK.

Catley, A. (2002). Participatory Epidemiology. Training course handouts.

Anonymous. (2001). Participatory Epidemiology lessons learned and future directions. Proceeding of a workshop held in Addis Ababa, Ethiopia (Nov. 15th to 17th 2001). Edited by Catley, A and Mariner, J.

Preparing For Retirement: Investment in the Nigerian Capital Market

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Introduction

Retirement can be regarded as the withdrawal from customary activity in business, industry or service. Retirement may apply to someone who is self-employed; it could be voluntary, when one is old, and wants to give way to a successor, or when one retires to enjoy one's old age in leisure. It could also be brought about as a result of ill health. For those employed by different organizations it could be voluntary, mandatory or forced. Whatever the case, once a person is engaged or employed to do a paid job, he should be aware that a time would come when he must disengage from that job.

Planning For Retirement

A worker should plan for retirement because the worker is faced with a situation where he earns less income on retirement. There is uncertainty over the economy, rising cost of living, people living longer lives, thanks to modern medicine and preventive care and the failure of government pensions. At retirement, there are various lifestyle changes such as reduction or even cessation of working, new accommodation and location, risk of loss of spouse, and relative inflexibility in life issues. The risk of ill health is higher with rising medical and healthcare along with the challenges of longer life. The financial realities include the risk of outliving ones savings and pensions, and the ever rising inflation could make nonsense of savings.

Retirement planning therefore entails determining the lifestyle one desires at the end of active working life and then making and implementing financial plans that will increase the probability that such standard will be achieved.

Several opportunities exist for someone planning for retirement; however, the particular circumstance in which an individual finds himself or herself will determine which opportunities can be taken. These opportunities include awareness of the need to plan and the options available; age, as the younger the more the time available for implementing plans; current employment which provides the needed fund for investment. One could also consider various insurance products and services. However, investing in the capital market has been shown to be about the best option for retirement planning. The importance of investing in the capital market with emphasis on the equities market derives from the fact that the prices of shares rise with rising inflation. Benson (2002) noted that despite the inevitable ups and downs the US stock markets' long term trend has been up – and dramatically so. This trend has also been witnessed in Nigeria.

Financial Markets

The financial markets are composed of the money markets and the capital markets. The money market is where instruments or products of short-term life span are traded and these instruments include bank deposits and loans, bankers' acceptances, treasury bills and certificates. The capital market is the market for long-term debts and corporate stocks. Capital market instruments include equities (ordinary shares and preference shares), debt (government bonds such as federal, state and local governments) and industrial loans/debenture stocks and bonds.

The Nigerian Stock Exchange (NSE) is the centre point of the Nigerian Capital market and provides a mechanism for mobilizing private and public savings, and makes such funds available for productive purposes. The Exchange also provides a means for trading existing securities.

The Nigerian Capital Market

There are two markets within the Nigerian Capital market: the primary market where new securities are issued and the secondary market where existing securities are traded. In the secondary market investors can only sell and buy securities through stockbrokers who are members of the Nigerian Stock Exchange. This market also creates a business for retirees who want to take up trading in shares as a business.

Advantages of Investing In Shares and Stocks

There are several advantages that place investment in shares in a superior position as retirement investment when compared with other investment avenues. Some of these include:

Wealth compounding
Investment in the stock market leads to a greater compounding of wealth than several other investments. Thus investors get dividends on their shares, bonus issues, and of course there is capital appreciation as the market value of the issues goes up over time.

Business diversification
When an investor has shares in several different quoted companies, he or she can reap from various sectors of the economy at the same time.

Silent store of wealth
Investment in shares does not "make noise" in contrast to investment in real estate or other physical investment.

Hedging against inflation
It has been discovered that in the long run, the prices of shares tend to move with inflation.

Reaping income with ease
Good investment in shares ensures that the investor's financial needs are met as and when due without putting much energy and effort.

Collateral for loans
Good shares may be tendered as collateral for loans from banks and other financial institutions.

Transfer to dependants and relatives
Once the legal requirements have been made shares can be conveniently transferred to surviving relatives in the case of the demise of the investor.

Honest wealth
An investor in shares does not need to cut corners, fudge figures, bribe or engage in diabolical means to become rich. It also provides an opportunity for those who want to gamble.

Conclusion

Retirement planning is a major challenge to all. It calls for conservatism and change of lifestyle. One's goal as an investor should simply be to purchase securities whose earnings are certain to be materially higher in five, ten or twenty years time. By spending less money now and making a commitment to regular savings/investment it is possible to create a massive amount of wealth in the future.

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References
Adeniyi, D.D. (2003). Retirement without Stress. St. Stephen Inc. Bookhouse.

Benson, D. (2002). 12 Stupid Mistakes People make with their Money.

Onekhena, G. (2003). "Preparing for Retirement: Challenges, Constraints and opportunities". Text of a paper presented at the 2003 Mandatory Continuing Professional Education (MCPE) programme of the Institute of Chartered Accountants of Nigeria (ICAN), held at Plateau Hotel, July 17th 2003.

Pam, L. (2003). "Investment in Securities through the Nigerian Stock Exchange". Paper presented at a workshop "Counselling for Retirement" at the Industrial Training Fund (ITF), Jos.

Ross, S.A., Westerfield, R.W. and Jaffe, J. (1999). 5th Ed. Corporate Finance. Irwin McGraw-Hill.

Shala, D. (1999). Understanding Capital Markets and the Secrets of Making Money on the Stock Exchange. Macmillan, Nigeria.
The Nigerian Capital Market. (2002). www.nigeriabusinessinfo.com

The Role of Planning and Budgeting in an Organisation

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Introduction

Todaro (1977) defined planning as a conscious government effort to influence, direct and in some cases, control changes in the principal economic variables (consumption, savings, investment etc) of a certain country or region over a course of time in order to achieve a predetermined set of objectives. Idama (1991) also defined planning as a purposeful and intelligent attempt through creative design to move a system from the present state to a more desirable future state. It involves the creative design of a future state incorporating all alternatives that could generate, at the time of design, a forecast of resources required to bring about the desirable future state. Planning has also been defined as a process directed towards making today's decision with tomorrow in mind and a means of preparing for future decisions so that they may be made rapidly, economically, and with as little disruption as possible.

Budget

A budget on the other hand has been defined as a blue print of a projected plan of action for the forthcoming year. In this context, budget is much more than a set of numbers and figures. It is a comprehensive statement of policy to guide the action of a government or organization throughout the on-coming year. The budget serves as a pattern for, and control over, future operations. It is an estimate of future costs against the backdrop of estimated revenue. It is simply a plan allocating resources to competing demands to the various components of an organization (Alhaji, 1990).

The difference between a budget and a plan is that while a Plan is a long-term expression of Policy, projects and Programmes, a budget is the yearly expression of the plan i.e. the yearly implementation of the plan.

The major thrusts of a plan are they are directed at the future using present information and they enable future decision making to be more precise. A plan is a long-range programme that can be broken into parts. It provides information input for planning processes and it can be reduced to suit immediate needs.

The advantages of plan are that it provides direction and better position; it provides for evaluation and monitoring of planning objectives and provides socially and economically useful results. It also provides for a most valuable direction and flexibility hence allowing for reviews.

Why Plan?

The primary purpose of any planning or budgeting exercise is system improvement i.e. moving from the present undesirable state to a more desirable and satisfactory future state. According to Idama (1991) any Planning exercise, which fails to radically improve the state of the system, has failed in its primary objective. For if one is contented with the present state of a system, then there is no need to embark on any planning in respect of the system.

Another rationale for planning is resource Mobilization and Allocation. Just as man's needs are limitless, so are those of organisation. However, the resources available for satisfying such needs are always grossly inadequate. Organisations cannot afford to waste limited resources (financial, human and material) on unproductive ventures. A careful, scientific and consistent way of allocating the scarce resources for the

maximum benefits of the organisation is needed. This can only be achieved through planning and budgeting. Planning gives an indication of the current state of affairs, future projections and the desired goals and how to achieve those gaols. This may be through policies, projects, programmes, activities and resource mobilization. The Plan and budget system links the past, present and future in an orderly manner. Some have referred to it as controlling the future. A proper and functional planning system provides greater effectiveness in achieving organizational efficiency. According to Abdullah (2000), the present state of an organization is the result of previous planning or lack of it as today is yesterday's plan, tomorrow is today's plan.

The Role of Planning Department in an Organization

The budget and Planning Department is expected to provide effective coordination of activities between various departments to ensure that there is no duplication of functions and activities. It is also to:
Act as a vehicle for exploring sources of revenue and enhancing creativity in revenue generation.
Coordinate the collection of data in various departments (each department is expected to keep data and records of its activities). The data collated and analyzed by the statistics unit to provide policy advice to management. Others are to:

- Conduct and promote in-house and external research on issues related to the organisation.
- Offer technical assistance to other departments on preparation of work plans and budgets.
- Design parameters for monitoring and evaluation and coordinate monitoring and evaluation of the Projects and Programmes of the Organization.
- Disseminate monitoring and evaluation findings to management.
- Preparation of periodic (quarterly, bi-annually or annually) progress reports.

The Role of Statistics in Planning

Statistics can be defined as numerical data collected, analyzed and presented in a scientific manner.
For planning to be meaningful, it needs to have both an efficient and effective statistical system. Statistical data relating to various aspects of the organisation will be required for arriving at wise decisions in either policy making or for planning. Precise, reliable, flexible, verifiable and timely data helps economic planners in compiling, analysing and drawing logical conclusion and facilitates good decision making. Precise data also assist planners in setting reliable targets. Without data, planning is reduced to mere guesswork and a trial and error exercise which often leads to plan failure. A prototype format presented as a guide for the Strategic Planning Department of the Institute is also attached on Table I.

Table I: A Prototype Plan for NVRI Vom

Indicator	Current Situation	Projection	Policies, Target-setting, Projects, Programmes, Activities
Revenue generation by type Expenditure ▪ Recurrent (salaries & overhead cost) ▪ Capital Manpower ▪ Skilled ▪ Unskilled Vaccines (production and marketing) Research Equipment Infrastructure Training Others …			

Structure of a Budget and Planning Department

The basic structure of a budget and planning department should include the following units:

Planning

Responsible for the preparation of long term projects and programmes of the organisation (the 3-year rolling plan & other plans) and ways of achieving them to meet the goal and objectives of the organisation. It is the unit responsible for providing economic policy advises to the organisation. It should set the targets to be achieved by every department, units or sections (this should be done in collaboration with the relevant departments, units or sections).

Budget

Responsible for the yearly implementation of the organisation's plan.

Statistics Unit

Responsible for data collection, collation, analysis and dissemination. One of the basic reasons for plan failures has been attributed to insufficient, unreliable and untimely data. Since it is expensive to collect data, the planning department must develop a clear plan for data collection. Such must identify not only what figures are required but also what is needed to collect the data such as equipment, manpower, funds etc. A good information system is essential for all departments of the organisation.

For a new department such as the Strategic Planning and Development Department, it is recommended that it should for now; concentrate on secondary data collection (i.e. data already available in the various departments of the institute). Relevant data can be obtained from the internal records of the various departments of the institute. This data should be the identified, collected, collated and analysed on a regular basis

Monitoring and Evaluation

This Unit is responsible for the continuous or periodic review of programme/project implementation by management to assess programme delivery, identify difficulties, ascertain problems and recommend remedial actions. Monitoring and evaluation is a feedback mechanism for policy intervention. If we do not monitor the implementation of our plans and budgets, we might not know if our plans are proceeding as desired. This function is performed in collaboration with other departments.

Research

Planning is a scientific activity. It must therefore be solidly based on the laws and principles of scientific investigations. There cannot be any meaningful planning without research. Research must precede planning just as budget and planning precedes implementation. Research will enhance the quality of the budget and planning.

The Planning department must undertake research on demand and supply of products of the institute and must design a system of marketing the institute's research findings.

For a new department like the Strategic and Development planning and Budget department of the institute, it might not be necessary to establish all the above units at once considering the cost involved and the manpower requirements. However, even where units cannot be created, some officers should be assigned the desk functions which each of these units is expected to perform. As the department grows, such units should be created to make the department fully functional.

Relationship between Strategic Planning with other Departments

Strategic planning is the process of carrying out the plan in a skilful way. The purpose is to achieve a specific purpose or to gain an advantage. The specific purpose in the case of NVRI is the achievement of the institute's objectives. The institute is guided by its mission and mandate.

The activities of all departments of the Institute should be geared towards achieving its mission and mandate. Therefore, all the Projects and Programmes of the departments only contribute to the achievement of the institute's goals and objectives. The departments are therefore not supposed to be in any form of conflict with each other or with the management if the end result is towards the attainment of the same objectives.

The relationship between the strategic planning department and other departments should therefore be a symbiotic relationship. While the planning department issues general guidelines on Budget and Plans to the departments, it depends on other departments for accurate or precise data or information. The other departments depend on the Budget & Planning department for processed data (being a data bank of the organization), technical support etc. Thus, the Budget and Planning Department would collect data on income and expenditure from the accounts department, production data from other departments, manpower data from the Administration Department, education data from the schools etc. The accounts department should therefore not consider the request for data on income and expenditure as an intrusion into their privacy, neither should other departments deny nor withhold data to the planning department. Unreliable and untimely data would definitely affect the Planning and Budgeting functions of the organization. The watchwords in this relationship should be cooperation and trust since the end result is towards moving the organization forward.

Requirements of a Budget and Planning Department

Being a "Think Tank" of the organization, the department requires the following to function efficiently and effectively. Requirements include:

Skilled Personnel

Such as Economists, Statisticians, health planners, computer scientists, analysts and programmers etc.

Training

The planner must be as active as a researcher, constantly engaged in updating his knowledge; otherwise, he would end up Planning with little and unreliable facts or with no facts at all (Dlakwa 2001). Several training programmes exist for planners at the National Centre for Economic Management and Administration (NCEMA) Ibadan. It is highly recommended that the staff of this department be trained in areas of needs. One of the most important trainings that are recommended in addition to other professional training is computer training. Every planner must be computer literate.

Equipment

Such as computers with relevant software, (the institute should consider setting up a data bank or strengthening one if it exists); vehicles and motorcycles for data collection and for research, monitoring and evaluation exercises.

Funding

Planning, especially data collection and research aspects are an expensive activities, it therefore needs proper funding if it will achieve its objectives.

Conclusions

An attempt has been made to identify the need, role and requirements of a Planning department in an organization and how such plans should be developed bearing in mind the present situation, the future (projection) and strategies for achieving set goals. The suggestions contained in this paper in no way exhaustive are only meant to serve as a guide. The challenge before a young Strategic Planning and Budget Department is that the Department is expected to develop plans and set targets to be achieved by the institute in the future. If such a plan is developed, management will have to be committed towards achieving the set targets.

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References

Abdullah, S. A. (2001). Monitoring and Evaluation of the Budget. Paper presented at the workshop on Public Expenditure Revenue, under the auspices of National Planning Commission, held at Maiduguri International Hotel – 11th – 14th February 2001.

Alhaji, A. A. (1990). Text of inaugural special lecture delivery by Alhaji Abubakar Alhaji, Hon. Minister of Budget & Planning under the Auspices of the department of Political Science, University of Lagos, Akoka – Yaba on 7th August 1990.

Dlakwa, H. D. (2001). Public Budget for Development, being a paper presented at a workshop on public expenditure review, Maiduguri International Hotel, 11th – 14th February 2001.

FGN (2000). Obasanjo's Economic Direction 1999- 2003 Office of the Hon. Minister Economic Matters April, 2003

Idama, A. (1991). Budget and Planning in a Political Transition period - Problems, prospects and Limitations – a paper presented at a budget workshop, jointly organised by the Department of Budget & Planning, Ministry of Finance, Plateau State and Ehiemua and Co (chartered Accounts) held at the Hill Station Hotel Jos, August 19th – 23rd 1991.

Todaro, M. P. (1977): Economics for a developing world Oxford University Press.

Financial Security as Related to Insurance

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Introduction

Risk is the possibility of an unexpected outcome, such as loss. The practice of systematically identifying, assessing and dealing with risk in order to eliminate or reduce exposure to it is known as Risk Management. At least, any of four approaches can be chosen to eliminate or reduce exposure to risk. These are avoidance, accepting and controlling, accepting and not controlling and transfer.

Avoidance

One common method of managing risk is to avoid it all together. Individuals can avoid the risk of financial loss by not investing at all. Insurers can avoid some risk of financial loss by rejecting applications for insurance or choosing not to enter a new product line. A person can avoid the risk of road accident by not leaving his home at all. Practically, avoiding risk is not an effective, viable option.

Accepting & Controlling Risk

Steps can be taken to prevent or reduce losses. Loss control refers to preventive measures taken to control all fortuitous losses due to fire, personnel safety, security and control.

Transfer

When is risk transferred to another party, one is shifting the financial responsibility for that risk to the second party, generally in exchange for a fee. The commonest way for most individuals and businesses to transfer risk is to purchase insurance coverage. Insurers also transfer risk by reinsuring in order to reduce the possible effect of catastrophic losses on their portfolios.

Financial Security

Financial Security in relation to Insurance is a risk transferred. The risks of loss of property, legal liability to public and to third party resulting in loss, (destruction, damage or death) are an economic loss. Insurance is purchased to protect against the possibility of economic loss. Economic losses vary widely in terms of severity, some being small and unimportant while some may be catastrophic in nature having a devastating monetary value.

Why do we insure?

If one drives a car, insurance is compulsory when you put the car on the road. Compulsory insurance has just been introduced to buildings with two storeys and any building to which the public has a right of access, e.g. Hotels, Lecture and School premises, etc. Homes and furnishings need to be routinely insured. There are risks peculiar to Marine and Aviation industries that must be routinely or compulsorily insured. Life insurance is important but not embraced in Nigeria. Insurance is the most common form of funding known against anticipated losses. Other methods include bank line of credit of risks, formal or informal pooling of risks amongst members of single industries and chronological stabilization plan, also called "spread-loss plans. Others are the traditional or customary method of family fund-raising whereby levies are imposed on extended family members to cater for the losses of an individual member.

Insurance

No matter how one plans, one's goals may be thwarted by unplanned events such as fire, accident, liability suits, embezzlement, death and other fortuitous losses. These resulted in the insurance industry providing insurance products such as:

General Insurance
Fire Insurance Policy

Burglary/Theft Policy
Householders Comprehensive Policy
Business Interruption
Personal Accident
Credit/Band
Goods in Transit
Motor Insurance
Marine Insurance Policy (Hull & Cargo)
Aviation Policy (Hall, Passengers Liabilities etc)
Oil & Rigs
Life Assurance
Term endowment
Whole life
Group Life
Personal Pension Plan
Group Pension Plan
Annuity Policies

Life Insurance Products

There are so many financial risks that go with life. Many hopes have been dashed, many business failed and many laudable projects abandoned just because of a death. When an individual has over many years carved a lifestyle for his household, his sudden demise without adequate provision can send the entire household into penury, children withdrawn from school, family ejected by landlord, property seized by creditors and sudden withdrawal to the village. Insurers have products that can take care of these risks. These are include Living benefits to the breadwinner himself upon survival to the specified date (maturity), death benefits to the named beneficiary/beneficiaries upon death of the insured and death benefit to the employers to settle the family of their deceased employees. Others are living (Pension) benefit to retired employees under a pension scheme, death benefit to the creditor(s) to take care of debts owned by the insured deceased and death benefit to the business outfit to replace the deceased.

The products are
Ordinary or whole life
Term Assurances
Endowment
Annuity
Personal Pension
Group Life and Pension

Ordinary Life
It provides whole life protection to the insured while premium is payable throughout the lifetime of the insured or for a limited time. Premium can be annually, semi-annually or monthly.

Term Assurance
Term Assurance are policies designed for people with temporary need for assurance. They can be taken as level term policies or Mortgage Protection Policies.

Level Term
This provides low-cost insurance protection for the individual who wishes to have the greatest protection at lowest initial outlay. It could be for temporary protection and could be converted to permanent as soon as convenient. It can be purchased as level term or mortgage protection policy. Both premium and sum assured remain level throughout the period of insurance.

Mortgage Protection
Cover can be provided by two special protection plans, one payable by a single premium and the other by annual premiums with coverage decreasing on either plan as the unpaid balance of the mortgage loan decreases. The primary objective of either plan is to provide low cost insurance against death of the borrower and assure the family full ownership of the home. Both plans are very low cost because the assured pays only for protection needed to cover the unpaid balance.

Annuity

Annuity is a specified sum payable at regular intervals during the life time of one or more persons. Payments are made at regular intervals for a stipulated period. It is retirement income which can be purchased with a lump-sum payment, such as a jackpot payment, gratuity benefit from contract, lifetime savings, proceeds from an endowment policy, etc. Annuity can also be purchased as a combination of an endowment policy with an endowment annuity policy as explained below.

Endowment Annuity Policies
These are retirement income purchases made by the payment of premiums of selected retirement age (55, 60 or 65). At maturity the policy provides that the policy owner will receive either a monthly annuity income of N10 for each N 1,000 of face amount for the remainder of his or her life with the guarantee that 120 monthly payments will be made even if the insured dies within the period, or in lieu of the monthly income, one of the following options will be taken
a single payment in cash (endowment)
A reduced single sum cash payment and a paid-up Ordinary Life Policy for an amount equal to the sum assured of the original policy or
A paid-up non-participating Ordinary Life Policy for an increased sum assured

The insured must produce evidence of insurability satisfactory to the company in order to select either of the first two options. Should the insured die after the commencement of annuity payments but before receiving 120 monthly payments, the remainder of such guaranteed payments shall be made. They become due to the beneficiary or beneficiaries, who have the option of commuting such payments into a single sum payment on the basis of interest at the rate of 3% per annum.

In 1994, another retirement plan was developed to enable the insured maintain a standard of living similar to what they enjoyed when gainfully employed. This plan is called the Executive Personal Pension Plan (EPP).

Executive Personal Pension Plan (EPP)
EPP provides a financial hedge against inflation in addition to making funds available to the insured at retirement. It is an investment linked plan that protects the living and alleviates the suffering of the dependants of the dead. It is available to any person under the age of 50. The normal retirement age is flexible and put between ages 50 and 65 provided that the policy has been kept in force for at least 10 years. It has a provision for early encashment only on account of death or ill heath. It cannot be surrendered. A regular annual premium is agreed at the inception with an added option of automatic 10% increase per annum on the regular annual premium. In addition, the insured is free to make additional contributions, which does not need to be regular, at any time during the term of the policy. The regular annual premiums are allocated to policy owner's account as follows:

Year 1, 50%; Year 2, 70%;Year 3, 85%; Year 4, 90%; Year 5, 95% and subsequently 100%. For each additional contribution the allocation is 95% of the amount.

A guaranteed rate of interest shall be declared annually in advance and credited to the policyholder's account on the anniversary of the policy. The guaranteed rate of interest is 2% above the net average savings account interest rates of the top 5 banks. Should death occur during the term of the policy the greater of either the Total Regular Annual Premiums payable over the term of policy subject to a maximum of N100, 000.00 or Accrued amount in the policy owner's account shall be paid.

Retirement Benefit
At retirement (whether normal or due to ill health) the insured may select any of the following options:
The whole of the accumulated amount in his account can be taken as a lump
The accumulated amount can be applied to purchase a Life Annuity
The insured can collect part of the accumulated amount and then apply the balance to purchase a Life Annuity. He can also defer taking the retirement benefit to a later date in which case, the amount in his account at the normal retirement date will accumulate with interest until actual retirement.

Group Life and Pension
These are insurances on groups of people with a common goal and include

Group Life Assurance

This is a Death-in service scheme where benefits are payable only at death of an employee to his or her named beneficiary or dependants. The lump-sum payment, usually a multiple of salary, creates an immediate estate for the dependants. The scheme affords maximum protection with a low premium outlay and the policy is kept in-force by the remittance of annual premium within the stipulated grace period of thirty days. The scheme is non-medical and individual members with insurance in excess of the group free sum assured (FSA) limit might be required to show evidence of good health by way of medical examination. Satisfactory medical results will guarantee coverage for the excess amount. This scheme can be taken alone or as an addition to a staff retirement benefit scheme.

Gratuity Scheme
This scheme provides for a lump sum payment to reward employees for long and meritorious years of service. The cost is usually borne by the employer and benefits are calculated in multiples of annual salary in relation to the length of service. It is inflation resistant since terminal salary is used in calculating benefits and may be designed as a separate scheme solely for the purpose of providing gratuity benefits

Pension Scheme
This is a staff retirement scheme, which provides regular income in form of annuities. The funding may be wholly borne by the employer or shared between the employees and the employer. Benefit attributable to the scheme is non-assignable and payments could be guaranteed for between five and ten years after a member's retirement or to his dependants after his death if within the guaranteed period. There is no restriction as to limit of contribution and periodic pensions are disbursed on monthly, quarterly, half yearly and yearly basis. The actual amount of benefit paid to a retiree is a function of final salary and years of service with the employer

Annuity Contract Scheme
This is an arrangement where periodic payments are made to the recipient or annuitant at regular intervals for a specified period of time or for the life of the recipient. Lump sum retirement benefit or gratuity benefit could be used to purchase annuity for life or for a guaranteed number of years. Benefits to the estate of a deceased staff may be used for dependants (usually minors) until they attain majority age.

Provident Fund
This is a contributory scheme where employees contribute a fixed percentage of their salary and the employer also contributes a fixed percentage on behalf of employees. As permitted by law, the maximum total contribution to this scheme (employer and employees contribution) is subject to 25% restriction of an employee's basic or gross salary. In administering this scheme, each employee's and corresponding employer's contribution are invested at a guaranteed rate of interest or invested through any other investment vehicle and this interest is credited to each member's and respective employer's account. The fund accumulates until death, termination or retirement. The amount of benefit available to a retiring or withdrawing employee will depend on the length of time he has been under the plan and the level of contribution. Upon retirement, a participant is entitled to take the accumulated value of his account in lump sum (cash), annuity or a combination of both.