

# NITROGEN BALANCE STUDIES WITH THREE BREEDS OF CATTLE MAINTAINED ON ALL — ROUGHAGE SUPPLEMENTED DIETS

By

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## ABSTRACT

Comparative studies lasting between 59—63 days were carried out using the N-balance method to investigate the effects of groundnut cake supplementation on N-metabolism and digestible crude protein (DCP) requirements of three breeds of steers maintained on all-roughage rations of hay and fresh grass of *Cynodon nlemfuensis* var.

## ROBUSTUS

The results indicated that N-intake (g/day) increased appreciably with supplementation. The percentage increases in the intake were 36.43; 40.03 and 46.42% for the White Fulani, crossbred and German Brown steers respectively, apparent digestibility coefficients for N also increased by 8.3%, 6.8 and 7.1% for these steers respectively.

Faecal nitrogen output (g/day) increased slightly with supplementation with all breeds of steers, while urinary nitrogen loss decreased with the White Fulani, increased with the German Brown and showed no difference with crossbred. Absorbed nitrogen (g/day), N-balance (g/day) and N-retention (%) all increased with supplementation.

Mean values for both metabolic faecal nitrogen (MFN) (gN/kg DM consumed) and endogenous urinary nitrogen (EUN)(g/day/wkg<sup>0.75</sup>) decreased with supplementation while the mean Biological value (BV)(%) increased. The values were 2.46gN/kgDM consumed) 0.11g/day/wkg/wkg<sup>0.75</sup> and 75.87% respectively.

Mean values for both metabolic faecal nitrogen (MFN) (gN/kg DM consumed) and endogenous urinary nitrogen.

## CARCASS YIELD AND COMPOSITION OF FATTENED YEARLING YANKASA WETHERS

By

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The carcass yield and composition of 18 yearling wethers were studied in a feedlot

trial that lasted two months. The animals aged about fifteen months were grouped

and fed *Digitaria* hay supplemented with a compounded concentrate ration fed at three levels of crude protein namely 10, 15 and 20% (Treatments A, B & C). At slaughter, the mean liveweights of the wether were 33.98, 37.80 and 38.52kg for treatment A, B and C respectively. Mean feedlot daily gains were respectively 131.07, 164.13 and 160.4g while dressing percentages were 44.64, 46.06 and 45.48% for the respective groups. Chilling loss accounted for about 5.23% of the weights of the carcasses. Wethers on treatment B had heavier kidney and abdominal fat. The lean meat to bone ratio were 0.35, 0.25 and 0.29 respectively.

Dressing percentage was positively correlated with average feedlot daily liveweight gain.

Treatment effects were particularly apparent on the chemical composition of lean meat. (EUN) ( $\text{g/day/wkg}^{0.75}$ ) decreased with supplementation while the mean Biological value (BV)(%) increased.

consumed)  $0.11 \text{ g/day/wkg}^{0.75}$  and 75.87% respectively.

Digestible crude protein requirements (DCP) decreased with supplementation in all the three breeds of steers. The values were 1.06, 0.38 and 0.81 ( $9.75 \pm 0.20$ )  $\text{g/day/wkg}^{0.75}$  by the N-balance method and 1.08, 0.51 and 1.2 ( $0.93 \pm 0.21$ )  $\text{gDCP/day/wkg}^{0.75}$

The DCP requirements therefore range from ( $0.75 - 0.93$ )  $\text{g/day/wkg}^{0.75}$  for these breeds of steers.

While there were decrease of approximately 13.14%, 1.90% and 6.4% in the mean DM intake from the basal rations, there were increases in the total DM intake (basan + GNC supplements) of approximately 0.42%, 11.66% and 11.04% of the indigenous, crosses and German Brown steers respectively. Supplementation resulted in non-significant ( $P > 0.05$ ) increases in the apparent digestibilities of the nutrients.

## NITROGEN UTILIZATION BY PREGNANT YANKASA SHEEP

By

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A series of N-balance trials were conducted during the last six weeks of gestation using nine Yankasa Ewes aged about  $2\frac{1}{2}$  years. The animals were fed on a basal *Digitaria* hay diet supplemented with compounded concentrate ration fed at three levels of crude protein namely 10, 15 and 20%.

Mean liveweight gains which were 125.7, 165.7 and 214.3  $\text{g/day}$  for the three treatment groups respectively were

significantly affected by the level of protein.

Urinary and N-retained increased linearly with dietary crude protein levels. There was a curvilinear relationship between N-intake and N-balance per unit of metabolic weight.

The crude protein requirements for pregnancy were obtained by equating to zero the derivatives of N-balance with respect to N-intake.

# NUTRITIVE VALUE OF *PANICUM MAXIMUM* DURING THE DRY SEASON

By

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The nutritive value of *Panicum* cut from the wild, was determined in a digestibility study with sheep.

Proximate composition are dry matter, 32%; crude protein 7.9%; crude fibre, 32%; ether extracts, 1.8%; and Ash, 8%. Dry matter intake was 0.52kg/day or 0.092kg/kg W<sup>0.75</sup>. Digestibility coefficients were DM, 69.1%; CP, 76.8%; CF, 68.1%; EE, 47.9%, NFE, 72.8; and energy, 68.8%. The total digestible

nutrients, starch equivalent and digestible energy values are 66.3%, 53.4% and 13.08 MJ/kg respectively. True digestibility of protein was 92%. The sheep made some weight gains during the experimental period and it appears that *Panicum maximum* even when not subjected to any treatment will satisfy maintenance and growth requirement of indigenous sheep during the early dry season.

## AVERAGE CHEMICAL COMPOSITION OF SOME SOUTHERN NIGERIAN FORAGE USED FOR FEEDING LOCAL SHEEP AND GOATS

By

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After weaning local sheep and goats obtain most of their foods from herbage growing in the native, unimproved pasture. Experience has shown that sheep and goats on good quality pasture need very little or no supplement feeding. Some authors have suggested that it is uneconomic to feed concentrates at a high level in any case to the above animals.

It is obvious that local sheep and goats fed the traditional way with only native grasses and fodder grow, mature and pro-

duce equally well as compared to those reared under improved conditions in government farms and other institutions.

In this experiment some browse plants commonly used for feeding sheep and goats were analyzed. From the results, it appears that the browse plants are richer in protein and lower in fibre than grasses and this may account for good performance of village goats often supplied with these browse plants.

# REPLACEMENT VALUE OF UREA FOR GROUNDNUT CAKE IN GROWING SHEEP FED LOW QUALITY NATIVE HAY

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## ABSTRACT

An experiment was conducted with 36 Yankasa lambs to study the effect of partial replacement of the dietary groundnut cake with urea on the growth of lambs fed low quality native hay. The experimental ration comprised of 6% hay and 40% supplement with treatments corresponding to 0, 1.25, 2.5, and 5 percent urea levels. On the basis of initial shrung weight and sex, the lambs were randomly assigned to the treatments and were individually fed for 95 days. Average daily gain, dry matter intake, feed intake per kg  $W^{0.75}$  and feed to gain ratio all expressed in grams are 30.7, 548.1, 62.5, 17.9; 30.9,

576.6, 68.5, 18.8; 24.5, 570.9, 64.4, 23.1; 24.4, 524.7, 62.2 and 21.8 respectively for treatments 1, 2, 3 and 4. There were no significant (PC.05) differences in ADG and feed intake per  $W^{0.75}$  among treatments. However, lambs on the 5% urea treatment significantly ( $P < .05$ ) ate less feed than those on the 1.25% urea treatment. Feed required per unit of gain was also significantly ( $P < .05$ ) less for the 0% urea treatment than for the 2.5% urea treatment. Given the low gains of the native stock and the present prices of groundnut cake and urea, the partial replacement of groundnut cake with urea is a viable proposition.

## A REVIEW OF THE NUTRITIVE VALUE OF GROUNDNUT CAKE AS A PROTEIN SUPPLEMENT IN RATIONS FOR GROWING PIGS

*By*

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## ABSTRACT

Literature was reviewed on the nutritive value of groundnut cake as a protein supplement in rations for growing pigs. Proximate analysis of groundnut cake shows that groundnut cake is a potential protein supplement for pigs. However, results of various authors show that groundnut cake is inferior to soyabean meal in its content and balance of essential amino acids.

Lysine was shown to be the most limiting amino acid in groundnut cake for pigs. Feeding groundnut cake as the only protein supplement and without supplemental lysine has been shown to result

in low feed consumption, poor growth and poor feed efficiency. Supplementation of groundnut cake diets with other sources of lysine resulted in improved performance.

Other limiting factors in groundnut cake include low palatability and presence of toxic factors. Evidence of a trypsin inhibitor in groundnut cake was shown but this was not a major factor limiting pig performance on groundnut cake diets. To be used as a major protein supplement for growing pigs, groundnut cake should be supplemented with a natural source or synthetic lysine.

# YIELD, NUTRIENT COMPOSITION AND IN VITRO DRY MATTER DIGESTIBILITY OF TROPICAL FORAGES AS INFLUENCED BY STAGE OF GROWTH

By

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## ABSTRACT

Three grasses and three legumes were sown in June, 1976 at Shika (Latitude 11° 15'N, longitude 7° 32'E) and sampled periodically for yield, crude protein (CP) content, water soluble carbohydrates (WSC) and *in vitro* dry matter digestibility (IVD) from 70 to 160 days after sowing.

Buffel grass (*Cenchrus ciliaris* cv Biloele), Rhodes grass (*Chloris gayana* cv Katambora) and green panic (*Panicum maximum* var. *triochoglume*) produced higher dry matter (DM) yields and took longer to reach maximum production than any of the legumes, soyabean (*Glycine max*), Townsville stylo (*Stylosanthes humilis*) and Carribean stylo (*S. hamata* cv Verano).

CP content with increasing plant maturity, the legumes being considerably richer in this attribute than the grasses of the same age. The low CP content of the grasses from day 140 onwards (3.6 — 5.9 per cent) would suggest the need to sup-

plement with concentrates unless the pasture or hay is legume based. The highest value of WSC, observed in respect of *C. gayana*, compared favourably with average legume WSC: however, whereas the WSC contents of all grasses rose up to day 100 before decreasing, those of *G. max* and *S. humilis* tended to decrease with time. Average per cent DM digestibilities for grass were 47.3, 30.8 and 24.9 for harvests taken on days 70, 140 and 160 respectively, compared with 63.3 and 45.4 for legumes harvested on days 90 and 140, respectively.

The implications of the data are discussed in relation to the place of highly productive grasses and of sole legume forages in raising the level of livestock production in Nigeria.

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# PRELIMINARY EVALUATION OF NITROGEN — FERTILISED AND LEGUME — BASED TALL GRASS PASTURES IN NORTHERN NIGERIA

By

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## ABSTRACT

**Gamba** (*Andropogon gayanus*), two varieties of Jaragua grass (*Hyparrhenia rufa*) and green panic (*Panicum maximum* var. *trichoglume*), grown in association with each of the legumes, centro (*Centrosema pubescens*) and Siratro (*Macroptilium atropurpureum*) or as sole crops receiving 0 or 100kg nitrogen (N) per hectare in 1978, were evaluated for dry matter (DM) yield and crude protein (CP) content.

The legume treatment, except centro with green panic, produced higher total DM and CP yields than the N treatment. Unfertilised green panic and introduced Jaragua grass gave the lowest yields of DM (1.67t/ha) and CP (105kg/ha) respec-

tively whilst gambe/centro or native Jaragua grass/siratro and green panic/siratro mixtures yielded the highest DM (7.9t/ha) and CP (851kg/ha), respectively. Siratro had a more rapid early seedling development and contributed 31—63% and 57—76% of the mixed sward yields of DM and CP, respectively, compared with centro's 23—55% and 43—71%. Succulence and CP content of grass increased when grown with legumes or N fertilised.

Effects of timing and splitting N applications appear to be worth investigating particularly in respect of the efficiency of N use relative to legume inclusion in long term sown pasture productivity.

## STUDIES ON THE REPLACEMENT VALUE OF BLOOD MEAL FOR FISH MEAL IN RATIONS FOR BROILER AND LAYING CHICKENS

By

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## ABSTRACT

In addition to an earlier report, three

the optimum level of inclusion and the replacement value of blood meal for fish meal in rations for broiler starter and

was conducted to determine the replacement value of blood meal for fish meal in laying chicken rations.

Results show that fish meal need not be added beyond 7.5 and 5% in broiler starter and finisher rations respectively. Blood meal was successfully utilised to

replace up to 67% of the fish meal in broiler starter rations, especially when fed after one week of age. In broiler finisher and laying rations blood meal successfully replaced all the fish meal. The inclusion of blood meal tended to result in lower feed costs and lower cost of production of meat and eggs.

## **FEEDING FARM LIVESTOCK IN THE TROPICS: SOME PROBLEMS OF RATION FORMULATION AND QUALITY CONTROL**

*By*

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The establishment of intensive production systems in tropical countries, like Nigeria, involving the transfer of technology from more developed situations and the use of imported livestock of high genetic potential, has introduced problems in meeting the dietary standard required for efficient feed utilization and for ensuring a good return on invested capital. The nutrient specification of feed ingredients in the tropics is frequently poor or, at best, very variable, and the range of ingredients may be severely limited by price or by availability. Such constraints, which can apply to both local and to imported raw materials, lead to the formulation of unbalanced rations and to a loss of production efficiency. The size of the problems can be magnified by specific local influences by example, some materials may be used at abnormally high inclusion levels because they are readily available, or prevailing conditions

of high ambient temperature and humidity may adversely affect the potency of many labile micro-nutrients in mixed feeds. The solution to these problems is not simple and, although a common pattern has been observed throughout the developing countries, there is no single answer. However, the existence of this pattern suggests that some general statement on the problems of quality control is possible, which could form a basis for specific local programmes designed to benefit both the livestock industry and the individual livestock producer. In this paper, the nature of the problem is illustrated by examples drawn from a wide range of field experiences, and recommendations are made on raw material purchasing, ration formulation and feed production techniques which have proved useful in resolving some of the difficulties.

# REPLACEMENT VALUE OF COTTONSEED MEAL FOR GROUNDNUT CAKE IN PRACTICAL BROILER DIETS

By

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## ABSTRACT

Experiment were conducted with Ross-type broiler chicks to determine the optimum replacement value of cottonseed meal for Groundnut Cake in practical broiler starter and finisher diets.

In the starters, cottonseed meal was included in the rations at levels of 0, 5, 10, 15, 20, 25, and 30% at the expense of groundnut cake on an equiprotein basis. In the finisher experiments, six levels of cottonseed meal (0, 5, 10, 15, 20 and 25)

were tested, each level replacing an equal amount of protein from groundnut cake. All the rations used were iso-caloric and iso-nitrogenous.

Results indicate that in both the starter and finisher diets up to 50% groundnut cake can be replaced with cottonseed meal without any adverse effects on the weight gain and general performance. It was also found that the higher the level of cottonseed meal in the diet, the cheaper the feed cost.

# SEASONAL INFLUENCE ON THE REPRODUCTION OF FRIESIAN CATTLE IN VOM

By

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## ABSTRACT

Five — year monthly distribution of calving, still-births, calf birth-weights as well as the age at first calving as influenced by the period of birth were examined. The data were analysed by one-way analysis of variance. The differences in monthly distribution of calves, still-births and calf birth-weights were not significant. However, two peaks (February — April and August — October) of calving

were observed; whereas the calf birth distribution showed no pattern. The mean and range of age at first calving were 28.12 and 19.43 — 40.07 months respectively. The period of birth significantly ( $P < .01$ ) influenced the age at first calving. The data suggested indirect effects of factors like temperature or day length on the reproduction of this breed in Vom and that the age of sexual maturity of the heifers could be improved through planned breeding.

**COMPARATIVE STUDY OF EMBRYONIC DEVELOPMENT IN  
LOCAL AND EXOTIC CHICKENS WITH PARTICULAR  
REFERENCE IN WEIGHT OF EMBRYO WITH INCUBATION TIME**

*By*

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**ABSTRACT**

Comparative embryological study with emphasis on embryo weight was carried out with Nsukka, Awgu and Owerri  $F_1$  local chicken and  $F_1$  starcross embryos that were subjected to the same holding, incubation and hatching treatment. The embryos were X-rayed for the early detection of ossification. Daily weight of the embryos during incubation was recorded and instantaneous relative growth rates calculated according to Brody (1945). It was found that between the 4th and 20th day of incubation that the local embryos: Nsukka  $K = 0.94$  to  $0.9745$ ; Owerri  $K = 0.73$  to  $0.892$ ; Awgu  $K = 0.620$  to  $0.837$  made on the average faster relative growth rates than the starcross  $K = 0.70$  to  $0.809$  in three replications. Exotic embryos were superior, however, to the locals in embryo liveweights. On the 4th day of incubation, the average wet liveweight of Exotic, Nsukka, Awgu and Owerri embryos were 0.041g, 0.026g, 0.054g and 0.031g respectively. On the 7th day, the Exotic was 2.337g, Nsukka 1.730g, Awgu 0.507 and Owerri 2.001g. The wet embryo liveweights on the 13th

day of incubation were Exotic 13.356g, Nsukka 4.987g, Awgu 6.600g and Owerri 6.691g. On the 20th day, Exotic embryos weighed wet 44.22g, Nsukka 24.97g, Awgu 24.28g and Owerri 26.99g. Ossification was observed to have started earlier in the locals: Nsukka, 6th day of incubation; Owerri and Awgu, 7th day than in the Exotic, 9th day. Initiation of feather buds were observed in both the local and exotic embryos on the 8th day. Initial entry of yolk sac into the body cavity started in the exotic on the 18th day but on the 19th day in locals. A crossbreeding programme between performance tested local chickens and select exotic chickens might improve the embryo weight of the locals while at the same time improving the instantaneous relative growth rate of the exotic.

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# A STUDY OF THE GROWTH PATTERN OF LOCAL AND EXOTIC CHICKENS

By

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## ABSTRACT

Eggs of deep-litter-raised Nigerian local  $F_1$  chickens from Nsukka, Awgu (Anambra State) and Owerri (Imo State) and  $F_1$  starcross (exotic) were hatched in a Robins Incubator and the chicks reared at Nsukka to 50 weeks of age under identical conditions: the same housing, deep litter management system and ad libitum feeding and water supply. Graphs on weekly liveweight records indicated the familiar sigmoid growth patterns for both the three local ecotypes and the starcross but with a remarkable genetic gap between the three locals on one side and the starcross on the other side. The local fowls reached major point of inflection of growth: Nsukka 14th week, Owerri and Awgu 13th week earlier than the starcross (15th week). The day-old body weights for Nsukka, Owerri, Awgu and the starcross populations were 27.45g, 26.83g, 29.66g and 42.28g respectively. The twelve week mean body weights were Nsukka 484.72g, Owerri 504.67g, Awgu 557.14g and starcross 728.18g. The locals (Nsukka 135 days, Owerri 139 days and Awgu 131 days) were younger at the point of lay of the first egg than the exotic (145 days).

During the first four weeks of the self-accelerating phase of growth, the locals and the exotic populations were almost the same in instantaneous relative growth

$d$ : Nsukka,  $k_1 = 0.050$ ,  $d = 43.86$  days; Owerri,  $k_1 = 0.049$ ,  $d = 14.10$  days; Awgu,  $k_1 = 0.050$ ,  $d = 13.86$  days; Exotic.

$k_1 = 0.054$ ,  $d = 12.83$  days. From week five to the major point of inflection of growth (second part of self-accelerating phase), the respective instantaneous growth rates,  $k$ , and body weight doubling time,  $d$ , for the populations were obtained as: Nsukka  $k_2 = 0.022$ ,  $d = 31.50$  days; and the Exotic  $k = 0.025$ ,  $d = 27.70$  days. The fact that the locals reached their point of inflection earlier than the exotic seem to indicate that the locals have earlier faster growth rate than the exotic in proportion to their body weights. This agrees with Oluyemi *et al* (1974).

In the study of growth, the instantaneous relative decline,  $k$ , in growth rates of the four populations were established to be  $k_3 = 0.010$ , — 0.010, — 0.009, and — 0.011 for the Nsukka, Owerri, Awgu and the Exotic birds respectively. The above estimations including the mature body weight estimates of 1250g Nsukka, 1450g Owerri, 1450g Awgu and 2350g Exotic were made according to Brody (1945). The starcross ( $F_1$ ) had the largest mature body weight estimate than the locals ( $F_1$ ) although Nsukka had the least mature weight among the locals. Comprehensive tables showing mean daily food and water intake under field conditions were presented from hatch to 50th week. On the whole, the exotics were better than the locals in feed conversion effi-

on the second week, eight week and eleventh week but the Nsukka and Exotic birds were found to be more stable and adaptable to the Nsukka environment than the Owerri and Awgu birds. Since the three local ecotypes did not differ considerably from each other in most of the characteristics studied, they could be pooled genetically in future studies.

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## PRELIMINARY OBSERVATIONS ON FREQUENCY OF OVIPOSITION AMONG SHAVER CROSSES IN IBADAN, NIGERIA

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### ABSTRACT

The eggs laid for 12 weeks by 144 Shaver 566 Starcross × R.I.R. crosses were collected at 2-hourly intervals at daytime (6 a.m. — 6 p.m.) and once at night (6 p.m. — 6 a.m.) to determine the period of maximum oviposition and the sizes of eggs laid during each interval. The results showed that 88% of all eggs were deposited at daytime. Peak egg produc-

tion was observed during 8—10 a.m. interval. By 12 noon and 4 p.m., 66.5% and 96.8% of all eggs had been laid. The number and sizes of eggs laid at each interval followed the same trend. For minimum egg losses, two (10 a.m. and 4 p.m.) and three (8 a.m., 12 noon and 6 p.m.) egg collection times per day are suggested for small and commercial egg producers respectively.

## EMBRYO TRANSFER, A POSSIBLE SOLUTION TO LIVESTOCK PROBLEM IN NIGERIA

*By*

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### ABSTRACT

The need to supply adequate animal protein to the over 80 million Nigerians in the 1980s was highlighted. Pro-

tempts at reducing the shortage was reviewed and embryo transfer is presented as one of the possible solutions to the chronic livestock shortage in the country.

discussed. The different stages in the transfer were discussed. In particular, the synchronization of both the donor and recipient animals, recovery of fertilized ova and the transfer methods of the recovered ova into the synchronized recipients were discussed.

How Nigeria stands to gain by involving her scientists in this laudable way of rapid livestock production, in the pro-

pagation of genetic potentialities of outstanding cows; in the cheap means of long distance transportation of cattle and the possibility of Nigeria becoming a center for research and dissemination of information in this field to developing nations was examined. It is suggested that embryo transfer may present the break through toward making Nigeria a livestock producing and exporting country.

## THE ROLE OF LIVESTOCK IN COMMUNITY DEVELOPMENT PROGRAMMES IN NIGERIA

By

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### ABSTRACT

In Nigeria, governments as well as international organisations have made use of livestock as one of the important tools of community development. A good community development programme must endeavour to solve the problems affecting the basic needs of the people in the rural communities a majority of whom are poor farmers suffering from malnutrition, especially the animal protein deficiency.

The local livestock in Nigeria are not as productive as their improved, exotic counterparts. Therefore, if the local animals are improved, they will be able to yield better quality and quantity of animal protein at a cheaper price to enrich our national diet and increase the number of able-bodied people working to increase our national economy.

In 1971, the Benue-Plateau State Government established a rabbit farming scheme at a cost of N80,000,000 aimed at encouraging farmers to rear and eat rabbit which is cheaper to raise than

During the post-war rehabilitation of farmers in the former East Central State of Nigeria, that state government used the following number of chickens and poultry feed for community development programmes through the help of the Community Development Section of the Administration Department and Ford Foundation of America.

Not less than 945,155 day-old chicks in 1970—1971, 1062 tons and 2810 bags of poultry feed in 1970—1971, 6000 pullets, 2500 cocks and 200 broilers in 1972—1973 were given to farmers at subsidized prices.

The Heifer project of America also uses livestock to support agricultural work of churches of all faiths in Nigeria. The church group so supported would initially embark on a scheme which should concentrate on operating as a breeding, distributing, training and demonstration centre for improved breeds of goats, sheep, pigs, poultry, rabbits and so on. Only those farmers who have received satisfactory training, built houses according to the committee's specifications

of the animals would qualify for receiving an animal. In addition, the farmer has to agree to return two young animals for the one which he received.

Most poultry have been so up-graded today that it becomes difficult to find pure native chicken in the rural communities. Animal protein intake among the local farmers has also increased.

The most successful livestock man in Isigwu Ohafia community, Mr. Raleigh Nmaju is undertaking to provide all on his own a rural electricity scheme costing ₦42,000.00 for the above community. Mr. Nmaju is also assisting the Isigwu people

in tarring the five-kilometre road linking the Arochukwu-Umuahia road by which action the people have been motivated to contribute a large sum of money towards defraying the total cost of ₦200,000.00 for the project.

The successful effect of livestock as a part of community development programmes in Nigeria has been possible through dedicated businessmen/farmers, extension workers and with improved chickens, pigs and goats etc. provided by government and international organisations.

## **ANIMAL PRODUCTS CONSUMPTION OF WORKERS AT THE UNIVERSITY OF NIGERIA, NSUKKA**

*By*

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A randomly selected sample population of 120 households made up of 820 members were divided into three income groups (LOW, MEDIUM, HIGH) and used in a survey to estimate animal products intake. Animal products intake was estimated from mean monthly amount spent on animal products, protein content of product and family.

Mean daily intakes of meat, fish egg and milk are 55.8g, 44.3g, 0.32 and 31mls, protein intake are 8.0, 16.4 and 19.2g per caput per day (on NPU basis). Meat, fish,

egg and milk contributed 40.7%, 35.8%, 8.4% and 15.1% of total animal protein intake. Amount spent on animal produces as percentage of income were 16.3%, 14.3% and 12.6% and as percentage of food budget the values were 37.1%, 37.0% and 40.9% for the low, medium and high income groups respectively.

It would appear that these workers take more animal products than the national average though high prices of these products is a constraint to higher intake.

# ECONOMICS OF PRODUCING GOATS FOR MILK IN SOUTHERN NIGERIA

By

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## ABSTRACT

Goats' milk nourishing and medicinal. The growing population of Nigeria demands the supply of adequate and well-balanced food in the national diet. Increased consumption of goats' milk will raise the nutritional standards of individuals making them healthier and stronger able-bodied citizens that would be available to work and increase the national income. Increasing our food production leads to a decrease in the outflow of foreign exchange for imported commodities such as canned milk.

Increase in the population of goats would increase the need for trained scientists and technicians to organize and manage goat stock improvement programmes. Southern Nigeria can attract foreign exchange by selling improved goats and their products including milk and meat to neighbouring African countries.

In uncultivated areas where farm animals have to depend on sparsely distributed natural vegetation the goats can fend for themselves and survive where the sheep and cattle may die of starvation. In other words goats in general are designed to scavenge.

The population of cattle in Southern Nigeria was reported to be 602.0 only out of the country's total of 10,858.6 some years ago. Unfortunately it is not economical to rear cattle on a large scale in the Southern Nigeria due to the problems from tsetse flies. Therefore goat production in this area, especially the Eastern States would make up for lack of cattle production here, since consumption of milk per head in Northern Nigeria was reported in 1964 to be 19kgs per year, 2.5kgs in the West and 1.4kgs in the East.

The poor land tenure system and lack of feed stuffs in Southern Nigeria militate against large scale production of cattle. So goat is therefore, a more reliable source of milk supply in this part of the country.

Efforts to improve our local goats for dairy production would help boost our economy as in Honduras, for example, when an American organization by name Heifer Project helped the government of Honduras to improve the country's goats, a major source of milk and meat for many families in Honduras.

The small size of goats makes them more convenient and economical to rear in Southern Nigeria than the cows.

# ECONOMIC SURVEY OF GARI PRODUCTION PROJECT IN SELECTED RURAL AREAS OF IMO AND ANAMBRA STATES OF NIGERIA AS PART OF MIXED FARMING WITH POULTRY INDUSTRY

By

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## ABSTRACT

Cassava is one of the staple foods of Nigeria especially in the Eastern States of the country. Some consumers may use the roots as gari while others use them as starch and foo-foo.

There are many varieties of cassava but the following high yielding new varieties are recommended for gari TMX6, TMX20, TMX90, TMX 1325, TMX1624, TMX30211, TMX30395, 59/159/ 91, 30568 and 63124.

Source of supply of cassava roots depends on the location of the gari industry. They could be obtained from various markets in rural areas as well as government farms.

The maturation for cassava roots suitable for making gari is from 1½—2 years to ensure high dry matter content.

After grating the peeled cassava roots, the pulp is tightly packed and tired in bags or sacks for 2 to 4 days until the HCN is driven out during fermentation process. During the frying process after sieving, small amount of palm-oil is added to improve the quality and colour of gari. About 29% of the unpeeled roots is fried gari.

It is believed that the greatest comparative advantage in the marketing of cassava products is in the production of gari.

The production project is phased over

15 years with the initial land area of 10 hectares in the first year, increasing by 10 hectares as the land becomes available yearly. 10 hectares produces 2 tons of cassava yielding 8 bags of gari per day. Cost of producing one bag of gari is about ₦9.60 while a bag of gari is sold at ₦30.00 per bag, yielding ₦20.4 as profit per bag making ₦163.20 for 8 bags per day.

Since crop and livestock supplement each other in land utilization and poultry does not require land this livestock industry can be added to an existing gari production project such as the above. This is the case with the few mixed farming projects on gari combined with poultry that were studied in Imo and Anambra States.

In the Hpolite Poultry cum Gari Production Farm owned by Mr. Okalanwa of Mbom-Ibèku in Umuahia area, 7000 pullets, 2000 broilers and 500 cockerels are produced along with several bags of gari per day, on a piece of land measuring 12 hectares. Some of the advantages are that with labour requirements and income spread more evenly over the years risk is reduced and this enables Mr. Okalanwa to sell his eggs and poultry at cheaper prices than the prevailing price in the market. This measure in turn increases demand by customers as well as attraction of new customers thus increasing the volume of sales.

Waste gari products (kpokpo gari) may

be used for livestock feed. This makes a good animal feed which would otherwise be wasted, since it is not a suitable human food. This waste gari product is already being packaged by the National Root Crop for sale as a livestock feed.

The poultry manure can be spread on

the land to increase soil organic matter and fertility for the cassava to yield better in quality and quantity.

As a result of this mixed farming practice described above, the total farm production is increased.

## POULTRY PRODUCTION COSTS IN IMO AND ANAMBRA STATES OF NIGERIA

By

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### ABSTRACT

Poultry industry in Imo and Anambra States has been characterized by fluctuation in levels of both production and prices. There are few large scale chicken production enterprises here to cater for millions of consumers.

For economic poultry management, there is no substitute for getting the right strain for the intended purpose — broiler or egg production.

Good layers that have been recommended in this study include B.C300, B.C.390. Warren, Brown Hyline and White Leghorn while Pilch, Cobb, Ross, Anak and Starbro are recommended as good broiler breeds.

The development of the poultry production is by phasing over fifteen (15) years starting with two hectares of land and 5000 layers in the first year, increasing to 10,000 in the second year and so on until a total of 110,000 layers is reached in the 15th year.

Marketing possibilities including the marketing of feed, eggs, day-old chicks, cull layers and broilers alive or processed (frozen) were considered but marketing

live birds directly to consumers without processing was recommended.

Using the assumptions of a model in this survey it would cost Imo-Anambra producers 17 kobo to produce one egg that is ₦2.04 per dozen with a 10,000 birds flock. This production cost is too high as it would require high price per egg or a dozen eggs for sale in order to at least recover the production costs. The following solutions are suggested:-

1. Increase the number of layers and adopt retail prices system.
2. Reduce the cost of maintaining the layers as well as reducing also the overhead cost on the equipment and the variable coast on labour both items of which have been identified as areas of heavy expenses in this exercise.
3. Increase the rate of lay by using better strains of layers than that which lays 200 eggs only per annum.

However, in the analysis, the producer still made a net profit of ₦3,032,683.37 due to the fact that he also sold feeds and cull birds; otherwise, if his proceeds were

have sustained a loss or rather he would not break even yet.

As from the 6th year, the cost of producing one day-old chick is 29 kobo. Therefore, the farmer would make more profits by raising and selling day-old chicks in addition to egg and broiler production.

In the circumstance, it is not possible for small flock sizes to break even, using the assumptions in the model, if a reasonable return to management is assumed. The large size operation results in a lower production cost for example the cost of producing one dozen of eggs with 40,000 bird flock is N1.40 as opposed to N2.04 per dozen with the 10,000 bird flock.

birds flock was N123,896.08 for equipment, N985,710.30 for housing and fencing, N8,442 for land and N56,615 for labour totalling N292,524.38.

The market eggs constitute the major source of income on the commercial poultry industries while hatching eggs, cull hens and broilers vary in importance as a source of income on private farms but in general they are of minor importance since commercial egg production is highly competitive and total investment is enormous, a beginner must gain training and experience from older farmers before starting commercial egg production business on a favourable size of operation suitable under his individual condition.

## EXTENSION STRATEGIES TO STIMULATE LIVESTOCK PRODUCTION IN NIGERIA

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### ABSTRACT

The development of the full potential of the livestock industry in Nigeria will be very difficult to achieve if it continues to be dominated by the age-long traditional system of animal husbandry as practised by the nomadic livestock raisers.

In a developing economy like Nigeria where the demand for meat and other animal products far exceeds the supply, and where efforts at encouraging the traditional nomadic livestock raisers to step up their production through adoption of improved method of animal production system has yielded no encouraging result, the importance of a very strong and effective livestock extension programme cannot be over-emphasized.

In Nigeria, approximately 80—90% of the cattle population, 61% of the sheep and 68% of the goat are owned by the nomads.

From time immemorial the nomads have always been the major supplier of animal protein for the entire country. There are presently no counter-indication for this situation. But it is apparent that the traditional system can no longer cope with the ever increasing demand for meat and other animal products.

It is also apparent that the nomads do not raise their animals for any serious economic consideration. The keeping of animals by the nomads has a traditional cultural value. Because of this, the nomads have been very reluctant to accept any innovations or improved animal

husbandry practices that can bring about general improvement in the animal production system.

Realising the role the nomads have been playing in supplying the animal protein requirements of the country and also appreciating the fact that the country all rely on this source for some time to come, we are forced into a whole sequence of realisations.

Owing to the uncertainties associated with attempts at sedentarizing a group of people who, for a long time have been practising and have grown accustomed to a nomadic way of life, we have a situation which is ripe with difficulties.

As an alternative to the consequence to enforce settlement, it would seem necessary to focus efforts in the direction

of evolving a new breed of livestock raisers alongside the existing nomadic situation. It is hoped that the new breed of livestock raisers will be amenable to innovations.

Two factors that necessitate this suggestion are:-

1. The nomads feel compelled to continue to move about and have no intention of altering that life style at any time in the foreseeable future.
2. That we are nearly totally reliant on the nomads for the country's protein requirement, and that they can no longer cope with the demand.

This paper suggests a series of extension strategies to stimulate livestock production in Nigeria.

## **ECONOMICS OF COMMERCIAL BEEF PRODUCTION UNDER FEEDLOT SYSTEM OF MANAGEMENT AT ZARIA**

*By*

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### **ABSTRACT**

Young Bunaji and Sokoto Gudali bulls were fed on agro-industrial by products and grains on a commercial scale with a view of encouraging livestock farmers to go into commercial fattening operations which could be economic and profitable if managed efficiently. 199(2½—3 years old) Bunaji and Sokoto Gudali bulls were purchased by contract, dewormed, sprayed against parasites and fed on milled and unmilled known quantities of a 14% crude protein concentrate mixture which consisted of undelined, undecorticated cotton seed cake and maize/guines corn grains along with any available roughage for 132 days. Regular

digestibilities of the rations were determined with some of the bulls. Sale of the fattened bulls were mostly on hoof while some were processed before sale. All inputs: initial cost of all the bulls, cost of feeds, labour and depreciation of the infrastructure were computed. Results showed daily gain between 0.60 and 1.56kg. In terms of carcass data and the economic parameters measured, Sokoto Gudali was found to be superior to the Bunaji breed. And fattening operation under the described system is commercially viable; an excess income of over N30,000 over expenditure incurred was realised.

# SOME DISEASE PROBLEMS IN THE SHEEP AND GOATS UNITS IN THE UNIVERSITY OF NIGERIA FARM, NSUKKA

By

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## ABSTRACT

Sheep and Goats can suffer from many diseases. Some of these are common and widespread throughout the country e.g. stomach worms and ectoparasite infestation. Other diseases can cause more trouble in certain areas than in other areas e.g. pneumo-enteritis. Again some diseases can be much worse in certain species than in others e.g. pneumo-enteritis.

All forms of disease hamper the well-being and so the economic production of sheep and goats.

A good sheep and goat farmer can reduce losses tremendously by anticipating trouble and planning his management, so as to prevent outbreak of trouble. Past experience and a sound knowledge of his farm and locality teaches a farmer what precautionary measures and system of management he should adopt.

A better understanding and a more enlightened management of sheep and goats demand attention.

In view of the above, it became necessary to carry out a preliminary study of some of the disease problems encountered in the sheep and goat flocks in the University of Nigeria farm at Nsukka. In this study, the heaviest mortality in sheep and goats is caused by pneumo-enteritis complex with mortality rate in the flock of goats up to 76% and in the flock of sheep 59% in 1977.

Other diseases encountered in the flock

Aspiration Pneumonia, Pregnancy/Dehydration, Broncho-Pneumonia, Septicaemia and Tapeworm Infection each of which has 2% mortality rate while Insecticide Poison and Inanition Dehydration have 4% and 8% mortality rate, respectively.

Among the sheep flock other diseases are Hydropericandum and abomastatis, Congested lungs and a Taenia infection, Tryps/Nutritional Deficiency, Inanition, Septicaemia, Exhaustion due to heavy ectoparasitism, Pneumonia and Inanition, Pregnancy toxemia and Tapeworm infection each of which has 3.7% mortality rate while Penumonia has 7.4% mortality.

Since pneumo-enteritis complex takes the heaviest toll of the flock, it is important that an effective control of this disease should be planned as there appear to be no cure for it except nursing or good management. Some of the symptoms of pneumo-enteritis include cold, miserable sighs and groans as the goat or sheep breaths. The back is arched, tips of ears and some-times other extremities are cold, mouth covered with foam and scouring begins at a latter stage. The eyes are covered with whitish substance while the nostrils are blocked by gummy, mucous, creamy to white coloured substance. In advanced stages, dripping occurs and the movement of water continues until the goat or sheep lies down as it becomes too weak to rise until it dies.

The sick animal attacked by pneumo-enteritis should be kept warm by pro-

viding heat, be it hot-water bottles buried under a deep bed of fine hay or logs of wood used for making fire even on concrete floor or earth floor. Six tablets of sulphonamide should be given to the

animals at the initial stage while four more tablets are given after four hours. Eventually, prevention is better than the cure of diseases.

## THE ROLE OF NATIVE DOMESTICATED FOOD ANIMALS IN THE DISSEMINATION OF ECHINOCOCCUS INFECTION AMONG DOGS IN SUDAN ZONE, NIGERIA\*

By

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AND

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### ABSTRACT

Infection with hydatid cysts of domesticated food animals slaughtered by private individuals and at the Government abattoirs in Sudan zone is recorded. Both fertile and non-fertile cysts were seen in infected slaughtered food animals.

Also, both bome and abattoir slaughtered camels, cattle, sheep and

goats seems to play important role in the dissemination of the parasite among dogs. The life cycle of *Echinococcus granulosus* in Sudan zone is proven established in this environment.

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*\*Paper presented at the 6th Annual Conference of the Nigerian Society for Animal Production, Benin City, 4 — 8th September 1979.*

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## INDICENCE AND IMPORTANCE OF CHRONIC MASTITIS IN NORTHERN NIGERIA GOATS

By

P.B. ADDO, C.N. CHINEME AND F.I.A. EID

### ABSTRACT

*Paper presented at the 6th Annual Conference of the Nigerian Society for Animal Production, Benin City, Nigeria*

*September 4th — 8th 1979*

A head count of female adults of Sokoto Red and Kano Brown breeds of goats was made in local farms, government farms and from some villages and towns in three states, Kaduna, Kano and Sokoto. There are the three most impor

tant goat raising States in Nigeria. A total of 5,816 female goats were examined. The incidence of chronic mastitis judged by pendulous udder involving one or both quarters was observed. Of the number of goats examined 637 (10.95%) had chronic mastitis, 217 (34%) of goats affected both quarters enlarged while 420 (66%) had one quarter enlarged. Of the 503 udders which contained milk 137 goats (27.2%) had both ducts blocked and 281 (55.86%) had one duct block. Milk from 150 goats were examined bacteriological and 58 (38.7%) were sterile while 92 (61.3%) had bacteria. *Staphylococcus sp.* was the commonest isolate and was also isolated from some apparently normal milk. Other pathogens such as *Corynebacterium*

*pyogenes*, *C. pseudotuberculosis* and *Nocardia sp.* were isolated from the milk and udder samples.

Chronic mastitis did not affect conception and kidding of the does. However, does which had no milk or had both lactiferous ducts blocked as a result of involvement of both quarters lost their kids within five days *post partum* due to starvation or early infection with *Pasteurella* and *Escherichia coli*. Does with one functioning quarter raised kids normally.

Factors considered responsible are injuries to the teat, blockage of lactiferous duct resulting in accumulation of milk in the lactiferous sinus, presence of bacteria in or around the mammary gland and consequently leading to clinical infection.

## SERUM MINERAL STATUS OF NORMAL AND DERMATOPHILUS CONGOLENSIS INFECTED FRIESIAN CALVES

By

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### ABSTRACT

Serum magnesium, copper, calcium, zinc, sodium and potassium levels were estimated in normal and streptothricosis infected Friesian calves. There was no statistical significant difference in all the minerals determined between normal and

infected animals although slightly higher and slightly lower mean serum copper and sodium were obtained respectively for infected animals. It was concluded that apart from mineral deficiencies speculated to predispose the animals to streptothricosis, other factors are involved.

# SERUM BIOCHEMICAL VALUES FROM NORMAL AND DERMATOPHILUS CONGOLENSIS (CUTANEOUS STREPTOTHROICOSIS) INFECTED FRIESIAN CALVES

By

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## ABSTRACT

Serum inorganic phosphates, chloride, urea, cholesterol, total proteins, globulin and albumin were determined in normal and streptothricosis infected friesian calves. The mean serum inorganic phosphate and globulins were significantly higher and serum urea was significantly

lower in streptothricosis infected animals. Among the reasons adduced for the differences, were the varying rates of nutrition and immunologic response of infected animals to the presence of the infective organism. It was concluded that apart from the skin, the other vital organs were not particularly affected by the presence of the infective organism.

# ROSTRAL TOOTH DEVELOPMENT AS A MEANS OF DETERMINING AGE OF CATTLE IN NIGERIA

By

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## ABSTRACT

Records of birth among livestock keepers in Nigeria are often completely absent or improperly kept, yet several age related parameters are often needed for economic, production and research reasons. Among these are age at first calving, age at puberty, age at height of productivity or at maximum weight gain.

Five hundred and forty-six cattle were sample from Kabomo farm, Ahmadu Bello University Farm and National Animal Production Research Institute Farm. The stage of rostral teeth eruption of the four incisors were determined and using the cross sectional method of survey the data were summarised. The chronological age was available in all cases. It was found that one of the first

permanent pair was present or one/both temporary absent at about 741.3 days, the second permanent pair was present at about 1014.8 days, the third pair was present at about 1895.0 days and the fourth pair present at 2886.0 days. The data compared favourably with previous workers but differs significantly with respect to the breeds. It was found that similar results in temperate cattle were only obtained in cattle with retarded development.

The paper discusses how reliable the data obtained are and gives detailed analysis based on the effect of plane of nutrition and 95% confidence interval for the figures. It summarises the importance of this type of work, being the first of its kind in Nigeria

# YIELD AND CHEMICAL CHARACTERISTICS OF MEAT OF 24—WEEK OLD LOCAL AND EXOTIC COCKS

By

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## ABSTRACT

First filial generation local cocks from three different ecotypes in Eastern State of Nigeria: Nsukka, Owerri and Awgu and an  $F_1$  male crossbreeds from Rhode Island Red cock and Barred Plymouth Rock females were used in the study to access and compare the yield and chemical characteristics of meat of chickens that were raised from day-old to the twenty-fourth (24th) week under the same environment and deep litter management system. Several measurements and chemical analyses on nutrient composition of the leg and breast flesh of 24 week old slaughtered cocks were subjected to various statistical analyses characteristic by characteristic, and population by population. Where appropriate, individual data were reduced to comparable levels using indices, for example, muscle index. It was established that the local cocks were inferior to the exotics ( $P/0.01$ ) in liveweight (Nsukka:  $1284.67 \pm 34.20g$ ; exotic:  $2302.67 \pm 44.03g$ ), and in plucked weight (Nsukka:  $1122.67 \pm 28.58g$ ; exotic:  $1954.33 \pm 39.78g$ ) and, therefore, have a smaller body size than the exotic cocks. But when comparison was made on index basis, that is, quantity expressed as percentage of liveweights the local cocks, Nsukka  $49.27 \pm 0.48\%$  were found to be better ( $P/0.05$ ) in meat yield or depressing

percentage than the exotics  $47.13 \pm 0.70\%$  and were not different ( $P/0.05$ ) from the exotic cocks in percentage plucked weight: Nsukka  $87.46 \pm 0.694\%$ ; Exotic:  $84.945 \pm 1.049\%$ .

In all the birds, higher yield of flesh ( $P/0.01$ ) was found in the legs; Exotic  $20.78 \pm 0.42\%$ ; Nsukka  $20.77 \pm 0.39\%$  than in the breast: Exotic  $13.58 \pm 0.42\%$ ; Nsukka  $13.95 \pm 0.37\%$ . Comparatively, the local birds developed breast bone better ( $P/0.01$ ) than the exotic birds while the exotic developed leg bones better ( $P/0.01$ ) than the locals. Generally, there were higher breast bone yield ( $P/0.01$ ) than the leg bone yield.

The local birds flesh were found to be of higher nutritive value ( $P/0.05$ ) than the exotic (Nsukka  $66.25 \pm 1.191\%$  total crude proteins in leg,  $68.83 \pm 1.073\%$  total C.P. in breast,  $7,896 \pm 1.14\%$  total fat in leg; Exotic  $59.24 \pm 2.45\%$  total C.P. in leg,  $63.21 \pm 1.83\%$  total C.P.,  $5.05 \pm 0.54\%$  total fat in leg). Significant differences were lacking ( $P/0.05$ ) in important characteristics namely liveweight, plucked weight, percentage of plucked weight to liveweight, dressing percentage or meat yield, and the nutritive value of the meat among the local samples. Selection for them can be made from anywhere of the three ecological types provided they are not crossbreeds.

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## EVALUATION OF THE ORGANOLEPTIC QUALITY OF EXOTIC AND LOCAL COCKS

By

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### ABSTRACT

The boiled and roasted meat from thirty-seven cocks comprising fifteen star-cross (exotic), fifteen from Nsukka area, five from Awgu area and two from Owerri areas (locals) were subjected to sensory and chemical evaluations for organoleptic qualities. The birds were fed ad libitum and given water free choice and raised under a deep litter management system. The birds were slaughtered at twenty-four weeks of age, an age adjudged appropriate for slaughtering the local cock for the traditional preparation of soup in Nigeria. The Owerri cocks did not enter into any statistical analysis but were used for information only.

There were found to be no significant differences ( $P/0.05$ ) in palatability, texture, tenderness and preference between the exotic and the locals for the roasted breast and thigh muscles, although the exotic tended to be more tender. However, significant ( $P/0.05$ ) differences did exist for boiled breast muscle between the exotic and the locals in colour, tenderness and preference. With regard to boiled breast meat, therefore, the following findings were made namely: The locals

$4.35 \pm 0.19$  and Awgu  $3.53 \pm 0.29$  had better colour (slightly grey to moderately grey) than the exotic  $2.5 \pm 0.21$  (moderately white to slightly white). The exotic  $6.8 \pm 0.23$  (moderately tender to very tender) was more tender than the locals Nsukka  $5.8 \pm 0.24$ ; Awgu  $6.3 \pm 0.19$  (slightly to moderately tender). On the whole, the exotic  $7.8 \pm 0.21$  (liked to liked much) was much liked or preferred than the locals' boiled breast meat: Nsukka  $7.0 \pm 0.22$  and Awgu  $8.0 \pm 0.19$ . However, Awgu appeared much liked than Nsukka. Also the colour of the boiled thigh muscle of the exotic  $4.4 \pm 0.15$  (slightly to moderately grey) was significantly ( $P/0.05$ ) better than the locals: Nsukka  $3.0 \pm 0.16$  and Awgu  $4.75 \pm 0.20$  put together.

The local thigh muscles contained significantly ( $P/0.05$ ) higher fat than the exotic thighs. Significant intra-population differences ( $P/0.05$ ) in total percentage fat content of the breast and thigh muscles were found for both the local and exotic meat of the cocks as follows: Nsukka  $2.30\% \pm 0.31$  breast,  $7.8\% \pm 1.14$  thigh; Awgu  $2.26\% \pm 0.37$  breast muscle,  $4.65\% \pm 0.04$  thigh; Exotic  $2.03\% \pm 0.27$  breast,  $5.5\% \pm 0.54$  thigh muscle. Similarly thigh muscles: Exotic  $0.136 \pm 0.01$ .

Nsukka  $0.18 \pm 0.02$  and Awgu  $0.142 \pm 0.035$  contained on the average significantly ( $P/0.05$ ) higher syoglobin than the breast muscles: Exotic  $0.07 \pm 0.015$ , Nsukka  $0.073 \pm 0.088$  and Awgu  $0.066 \pm 0.038$ . The average iodine number in the thigh and breast muscles in either the exotic or locals was significantly different ( $P/0.05$ ). The locals and the exotic did not differ from each other significantly ( $P/0.05$ ) in saponification values even though it was found in both

the exotic and local cocks that the saponification values of the breast muscles were significantly higher ( $P/0.05$ ) than those in the thigh muscles. Moisture content and crude fibre percentage was not different ( $P/0.05$ ) for exotic and local thigh and breast muscles. The no palatability difference found between the meat of the local and exotic chickens of comparable age strengthened Oluyemi *et al* (1973) findings.

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## A DETAILED BIOMETRICAL STUDY OF THE CONFORMATION OF PUREBRED BORAN, MUTURU AND N'DAMA BEEF CATTLE

By

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### ABSTRACT

A Detailed biometrical study on the conformation of mature (over four years old) females of purebred Boran ( $N=23$ ), Muturu ( $N=32$ ) and N'dama ( $N=30$ ) beef cattle was made at the University of Nigeria farm. The Boran (*Bos indicus*) is a large and heavy breed with prominent cervicothoracic hump. These brown and white Borans were polled. The Boran had the following average measurements: body length  $119.82 \text{ cm} \pm 6.77$ ; tail length  $109.27 \text{ cm} \pm 6.91$ ; height at the withers  $122.03 \text{ cm} \pm 13.17$ ; heart girth  $169.23 \text{ cm} \pm 8.89$ ; neck length  $59.40 \text{ cm} \pm 5.61$  and body weight at the beginning of the dry seasons in November  $344.68 \text{ kg} \pm 49.92$ .

The corresponding average measurements for 32 Muturu cows were:  $94.89 \text{ cm} \pm 7.62$ ;  $79.04 \text{ cm} \pm 4.51$ ;  $89.46 \text{ cm} \pm 7.69$ ;  $129.06 \text{ cm} \pm 8.26$ ;  $42.03 \text{ cm} \pm 3.00$  and  $140.07 \text{ g} \pm 21.54$ . Muturu (*Bos brachyceros* of *Bos taurus* origin) have a straight-line back and are docile. The Muturu which are predominantly black out with some having white patches are a small breed with short horns. The N'dama, on the other hand, possess prominent and fierce looking horns and are indeed aggressive and unfriendly especially when they calve newly. The N'damas which are light brown (fawn) and dark brown (dun) have straight-line backs since they belong to the *Bos taurus* generic group. The N'dama cows measured on

the average: body length 102.52cm  $\pm$  10.53; tail length 105.58cm  $\pm$  12.95; height at the withers 100.13cm  $\pm$  7.42; hearth girth 140.53cm  $\pm$  9.86; neck length 47.78cm  $\pm$  6.10 and body weight 200.39cm  $\pm$  25.23. The average "poll to muzzle" length and the "eye to eye" width head measurements for Boran are respectively 49.70cm and 21.00 cm. Whereas Muturu measured 40.89cm and 19.15 cm, the N'dama had 41.89 cm and 19.83 cm in head measurements. Highly significant differences ( $P < 0.01$ ) were found among the breeds in body length, height at the withers and body weight. With regard to beef conformation, therefore, the Boran is a heavy breed while Muturu is a small breed indeed. the N'dama is intermediate between the two. In Muturu, significant simple phenotypic correlations,  $r$ , were found between body length and tail length (0.387,  $P < 0.05$ ); between body length and hearth girth (0.627,  $P < 0.01$ ); between body length and neck length (0.393,  $P < 0.05$ ); between heart girth and neck length (0.449,  $P < 0.05$ ); between hearth girth and body weight (0.368,  $P < 0.05$ ); between neck length and body weight (0.576,  $P < 0.01$ ). From a multiple regression analysis it was found that the best predictor of body weight in Muturu was neck length with a confidence of 33.2%. Other predictors:

tail length heart girth and height at the withers had confidence levels of 2.4%, 1.7% and 0.0% respectively. In N'dama, only height at the withers correlated simply and significantly with heart girth (0.605,  $P < 0.01$ ). There was no satisfactory predictor of body weight in N'dama although the multiple regression coefficient,  $R$  and the goodness of fit,  $R^2$  between body length and body weight were (0.193, 0.371) showing that body length had only 3.7% confidence level as a predictor of body weight. Heart girth had only 0.43% confidence level. In Boran, there were highly significant simple correlations between body length and heart girth (0.647,  $P < 0.01$ ) and heart girth and body weight (0.633,  $P < 0.01$ ). A multiter regression analysis revealed that as a predictor of body weight in Boran, heart girth measurements have a confidence level of 40.0%. Height at the withers (4.29%), body length (4.4%), tail length 1.1% and neck length 0.0% have low confidence levels to be of value. Indices for selection programmes and estimation of body weights could be got through some linner body measurements. The above results call for a refinement of the Johnson Minnesota formula for Nigeria Cattle; 'Rose (1958) modifications not withstanding.

## PRELIMINARY OBSERVATIONS ON THE BLOOD PICTURE OF LARGE WHITE (YORKSHIRE) PIGS IN THE NORTHERN GUINEA SAVANNA OF NIGERIA

By

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### ABSTRACT

Blood samples were obtained from 34

pregnant large white pigs in Zaria and Kano areas for haematological evaluation. Parameters determined included

Hb, PCV, RBC, WBC, MCU, MCH, MCHC and leukocyte differential counts. The pigs were from private small farms, a commercial farm and an institutional farm. Significant differences were observ-

ed in the pigs examined. It is suggested that these values could serve as baseline for interpretation of blood values of Large White Pigs under similar management and husbandry practices.

## SKIN AND HAIR CHARACTERISTICS OF BORAN, MUTURU AND N'DAMA BEEF CATTLE

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### ABSTRACT

THE skinfold thickness, skin pigmentation and hair colour and characteristics of 30, eight to ten months old yearling Boran, Muturu and N'dama Cattle were investigated upon at three different positions of the animal's body designated as Forelimb, Hindlimb Fore and Hindlimb After respectively. All the cattle were of identical age and were born in the same calving season (February to April, 1978) at the University of Nigeria Farm at Nsukka. All experimental animals were reared under the same level of management. Highly significant differences in mean skinfold thickness ( $P < 0.01$ ) were found among the breeds in the following order: Boran  $7.88\text{mm} \pm 0.46$  higher than N'dama  $5.53\text{mm} \pm 0.25$  which in turn was higher than Muturu  $3.88\text{mm} \pm 0.28$ . The highly significant differences ( $P < 0.01$ ) in mean hair length indicated that the Boran  $0.75\text{cm} \pm 0.04$  had the best hair length required for efficient heat dissipation in the humid tropical environment of Nsukka, while the N'dama  $1.09\text{cm} \pm 0.11$  had a better hair length than the Muturu  $1.15\text{cm} \pm 0.08$ . Hair depth analysis showed also highly significant differences ( $P < 0.01$ ) among the breeds in the order: N'dama  $0.85\text{cm} \pm$

$0.85\text{cm} \pm 0.08$ , Muturu  $0.82\text{cm} \pm 0.10$  and Boran  $0.33\text{cm} \pm 0.03$ . However, a consideration of hair depth in its relation to hair length, the Boran again ranked first.

Brown Boran came next with 50.30 counts  $\pm 2.68$ , 56.39 counts  $\pm 2.15$  and  $38.88^\circ\text{C} \pm 0.28$  respectively whereas the N'dama scored on the average 51.85 counts  $\pm 2.86$  for respiration rate, 62.17 counts  $\pm 1.83$  for pulse rate and  $39.37^\circ\text{C} \pm 0.27$  for rectal temperature. The corresponding high average values for the least adaptive breed, Muturu were: 63.51 counts  $\pm 3.16$ , 65.87 counts  $\pm 2.76$  and  $39.76^\circ\text{C} \pm 0.23$ . For all the three characteristics namely: respiration rate, pulse rate and rectal temperature, highly significant differences ( $P < 0.01$ ) existed between March readings and December, January for February readings indicating that March had the highest Temperature — Humidity Index (THI). With regard to heat tolerance index the ranking order was as follows: white Boran 99.67, light brown Boran 94.47, the dark brown N'dama 89.06 and the black Muturu 82.48. Indeed the overall ability of the breeds to dissipate heat under the Nsukka environment agreed with the above ranking order according to this study. Genetic, size adaptability observed Highly

significant correlations ( $P < 0.01$ ) were found between each of the three characteristics with ambient temperature

at Nsukka. More research in morphological and productive characteristics of the breeds was envisaged.

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## THE PHYSIOLOGICAL RESPONSE TO THE HUMID TROPICAL ENVIRONMENT OF NSUKKA OF THREE BREEDS OF BEEF CATTLE WITH SPECIAL REFERENCE TO HEAT DISSIPATION FUNCTIONS

By

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### ABSTRACT

Twenty yearling cattle, aged eight to ten months at the start of experiment and born in the same calving season of February to April 1978 and under the same rearing and management conditions, were studied for four months (December, 1978 to March, 1979) in weekly intervals to find out their relative adaptability as determined by respiration rate, pulse rate and rectal temperature to the humid tropical environment of Nsukka. Five animals each of White and light brown Boran type dark brown N'dama and black Muturu breeds of beef cattle were involved in the study.

Highly significant differences ( $P < 0.01$ ) were found in each of the three characteristics among the breeds both for morning and afternoon readings. It was found that in the morning, the White

Boran had relatively the lowest respiration rate  $41.47 \text{ counts} \pm 2.82$ , pulse rate  $48.49 \text{ counts} \pm 2.58$ , and rectal temperature  $38.22^\circ\text{C} \pm 0.22$  when compared to the brown Boran with  $41.07 \pm 1.54$ ,  $50.29 \pm 2.48$  and  $38.37^\circ\text{C} \pm 0.26$  respectively. The brown N'dama had comparatively moderate mean values of  $41.23 \text{ counts} \pm 1.76$  respiration rate,  $53.27 \text{ counts} \pm 1.92$  pulse rate, and  $38.51^\circ\text{C} \pm 0.32$  rectal temperature than the higher mean values scored by the Muturu  $54.98 \text{ counts} \pm 5.6$ ,  $55.78 \pm 3.91$  and  $38.85^\circ\text{C} \pm 0.22$  respectively. In the afternoon, the order of adaptive response of the animal types (breeds) to the Nsukka environment was white Boran  $46.54 \text{ counts} \pm 2.16$  respiration rate,  $53.82 \text{ counts} \pm 2.29$  pulse rate and  $38.48^\circ\text{C} \pm 0.27$  rectal temperature with regard to heat dissipation, while N'dama came second

and the Muturu third in rank order for the breeds that showed highly significant ( $P < 0.01$ ) differences in hair population per 19mm<sup>2</sup> was N'dama 497.83 ± 32.7, Muturu 405.2 ± 47.4 and Boran 348.7 ± 47.4 and Boran 348.7 ± 33.2. Such Characteristics as hair diameter, hair weight and hair density did not show significant differences ( $P > 0.05$ ) in the breeds studied. The observations made by Pan (1963) that skinfold thickness increased in a posterior - anterior trend while the hair length and hair depth increased in an anterior - posterior trend were confirmed by our

results with Muturu and N'dama cattle. An integration of our observations on the coat colours of the breeds: Boran (white and light brown), N'dama (dark brown) and Muturu (black) with the measurements on the skin and hair characteristics indicated that Boran, N'dama and Muturu are adapted to the Nsukka environment in that order.

Need was found for further work on the morphological characteristics of the skin and the real productive data on the breeds to finally determine which of the breeds was best adapted to Nsukka.