SHEEP AND GOATS
EFFECTS OF VARIATIONS IN DIETARY ENERGY LEVELS ON THE GROWTH AND CARCASE QUALITY OF THE NIGERIAN DWARF SHEEP

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TWENTY-FOUR Nigerian Dwarf rams 6 months of age were divided into 4 groups and fed a basal ration of grass and a supplementary concentrate mixture calculated to supply energy for production at levels representing 50, 75, 100 and 125% of the ARC (1965) recommendations for fattening sheep. The feeding trial lasted 12 weeks during which feed intake and weight gains were measured, and at the end, all the animals were slaughtered and the carcases analysed. Daily dry matter intakes per animal were 512, 675, 764 and 875 for the 50, 75, 100 and 125% levels, respectively. There were no significant differences in live-weight gains. Live-weight at slaughter averaged 22.5, 24.2, 23.6 and 24.0 kg. Dressing percentages were 52.4, 50.7, 49.9, 52.9, but the differences were statistically non-significant. There was no economic benefit in feeding at the higher levels of the ARC (1965) recommendation. It is suggested that supplementary feeding at the 50% level would be economic.

METABOLISM STUDIES WITH LAMBS

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METABOLISM trials were carried out in a 4 x 4 Latin square on eight castrated male West African dwarf sheep, 1-1.5 years old and with live weights ranging from 13 kg to 26 kg which were maintained on four experimental rations, composed of a basal ration of Cynodon nlemfuensis/Centroserma pubescens hay and four concentrates, the crude protein content of which ranged from 5 to 17%. Four of the animals, one from each group had permanent rumen cannulae. The digestibility of N and retention of N increased with increasing levels of dietary N. Significant correlations were found between N balance and N intake (r=0.98), faecal N and % crude protein of the rations (r=0.75), % digestibility of N and % crude protein of the concentrates (r=0.97), blood urea and ruminal ammonia levels (r=0.82). There was very good agreement between the values of the metabolic faecal N determined by the extrapolation methods and the detergent method. Ruminal protozoal protein was found to be richer in essential amino acids than ruminal bacteria protein. Ruminal bacteria obtained from hay-fed animals were poorer in essential amino acids than those obtained from animals fed hay and concentrates. There were no significant differences between the fistulated and the intact animals in the parameters considered.
UTILIZATION OF DIFFERENT ROUGHAGES SUPPLEMENTED WITH POULTRY DROPPINGS BY SHEEP

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Metabolism trials were conducted with sheep to investigate the use of poultry droppings as a nitrogen supplement in low-quality roughage rations. Air-dried poultry droppings were incorporated into rations containing dried grass, oat straw and extruded wood at levels 6, 15 and 20% of the ration dry matter, supplying 18.7, 50.2 and 64.2% of the total ration nitrogen, respectively. The roughage sources tended to have a greater influence on the nutrient digestibility than the level of poultry droppings in the rations. The digestion coefficients for dry matter, gross energy, crude fibre and cellulose, were significantly higher in the dried grass ration than the extruded wood ration, while values for the oat straw ration were intermediate. Crude protein and ether extract digestion coefficients did not show any significant differences among rations. Slight but not significant differences were observed in the Relative Intake (RI) values among rations. The Nutritive Value Index (NVI) and digestible energy (DE) intake values for the dried grass ration were significantly higher than those for the other rations and compare favourably with that expected for high quality forages.

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COCOA HUSK: HAS IT ANY FEEDING VALUE IN LIVESTOCK FEEDS?

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Some studies have been conducted to determine the feeding value of cocoa husk in livestock feeds. In one study, the corn component of a basal ration was replaced with cocoa husk at 25%, 50% and 100% levels. These rations were fed at computed maintenance levels to 4 wethers and 4 castrates in two separate but concurrent digestibility trials.

The results showed that there were no significant differences in the performances of both the sheep and the goats as determined by body weight changes. Although crude fibre digestibility in both groups of animals increased with increases in the level of cocoa husk up to 100%, it was slightly higher in the goats than the sheep at 100% substitution level. However, at 50% substitution level, crude fibre digestibility in the sheep was even better than at 100% substitution level in the goats.

In another study, a 10-week feeding trial was conducted with 160 growing chickens from the strain of Harco (a commercial hybrid) x Rhode Island Red (RIR) crosses. The control ration contained 16% groundnut cake and 4% rice bran. In the three other experimental rations cocoa husk which replaced rice

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brent as a source of roughage constituted 10%, 15%, and 20% of the rations with corresponding decreases in the corn components of the respective rations. Furthermore, groundnut cake was increased to 18% in rations II, III and IV respectively in order to adjust for the expected protein decrease in the total protein content of various rations as the levels of cocoa husk in them increased.

The results of the experiment showed that the inclusion of 10%, 15% and 20% respectively of cocoa husk in growing chicken rations resulted in no adverse effect on feed intake and dressing percentage but decreased by 25.4, 18.3 and 5.6% respectively in body weight gains of chickens.

The results of these studies are interpreted to mean that when cost factors are put into consideration cocoa husk, hitherto considered a farm waste, may become a valuable feedstuff in reducing feed costs without serious adverse effect on the performances of livestock.

STUDIES ON COMPARATIVE UTILIZATION OF UREA AND GROUNDNUT CAKE RATIONS BY YOUNG GROWING WEST AFRICAN DWARF GOATS

Effects on Carcass Quality and Chemical Composition of the Organs and Muscles.

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Twelve West African Dwarf male castrated goats, 6-8 months old, ranging in live-weight from 7 to 15 kg, were main-

ained on cassava flour-based rations with two sources of nitrogen from urea and groundnut cake. Each nitrogen source was fed to the goats at three levels of crude protein (N x 6.25) viz 10, 17, and 24%. These rations constituted the concentrates and were used as supplements to Cynodon nlemfuensi var sobusotus. Six of the goats were slaughtered at about three months after being maintained on the dietary treatments and the other animals at six months after being fed on the diets. Results obtained from the carcass, organs, and muscles seemed to indicate that: (a) The dressing percentage (51.2) of animals on the groundnut cake-based supplement was not significantly higher than that of animals on the urea ration (50.0). (b) The sources of protein (N x 6.25) had no adverse effect on the major cuts, such as the leg, loin, shoulder and so on. (c) The chemical components with regards to fats and protein of the organs and muscles, were not significantly affected by the sources of protein or nitrogen (P<0.05).

THE EFFECT OF VARIATIONS IN ENERGY INTAKE DURING LATE PREGNANCY ON LAMB BIRTH WEIGHTS AND THE LACTATION OF THE NIGERIAN DWARF SHEEP

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Eighteen Nigerian Dwarf ewes about nine months of age and weighing between 15 and 20 kg were divided into three groups, A, B and C, and fed diets containing 75%, 100% and 125% of the ARC (1965) energy standards for sheep for late pregnancy and lactation. Mean daily
intakes of dry matter during the last seven weeks of pregnancy were 569, 748 and 826g, digestible organic matter 259.8, 496 and 593 for groups A, B and C respectively. These intakes were calculated to be 0.99, 1.81 and 2.16 Mcal of metabolizable energy per day for the respective groups. The mean daily intakes of dry matter during lactation were 660,748 and 857g, digestible organic matter 287,593 and 690g for groups A, B and C respectively. The intakes were calculated to be 1.05, 2.16 and 2.51 Mcal of metabolizable energy per day for the respective groups. Mean daily liveweight gains during the last seven weeks of pregnancy were 14.2, 99 and 90g for groups A, B and C respectively, the differences being highly significant (P<0.01). Liveweight gains were considerably lower during lactation, 43, 7.9 and 10.4g for groups A, B and C respectively, the differences being highly significant (P<0.01). Mean lamb birth weights, 1.18, 1.77 and 1.82kg for groups A, B and C respectively, were non-significant. During a 10 week lactation period average daily milk yields of 322, 400 and 430g differed significantly (P<0.01) for groups A, B and C respectively. Peak yields were 480, 695 and 675g for groups A, B and C respectively between the 2nd and 3rd weeks of lactation. Mean fat content of the milk (6.0 to 6.4%) remained relatively constant throughout lactation. Mean protein values were 48.2, 5.63 and 5.78%, lactose 4.15, 4.30 and 4.34%, total solids 15.98, 16.88 and 16.95%, and gross energy 6.12, 6.18 and 6.39 kcal/g for groups A, B and C respectively. None of these differences were significant among treatment groups.

NUTRITIVE VALUE OF FIVE HAYS AS FED TO SHEEP

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IN a feeding experiment, five different roughages, viz: Chloris gayana, Andropogon gayanus, Stylosanthes guayanensis S. humilis and Arachis hypogaea were used for fattening local and crossbred rams. The hays were supplemented with 450 g concentrate (50% sorghum and 50% groundnut cake). Growth rates and intakes were measured, the hays were tested for their in vitro dry matter digestibility (D.M.D.). Intake figures were used to calculate the digestible energy used to give expected gain. Daily liveweight gains were low, there was no significant difference between the breeds, while all the hays differed significantly from each other. The two grass hays proved to be unsuitable for fattening, the two Stylo hays were satisfactory, while the Arachis haulms were rather good. Expected daily gain was, in most cases, much higher than the observed gain. This might be due to either an overestimation of the roughages using the formula designed by Harris et al, or inefficiency of the animals. Looking at the dry matter digestibility, the former seemed most likely. Intake of the forages was rather low, in agreement with the digestibility figure and compared with the standard forage intake of 80 g/kg W.75, which figure was taken from good legume hays. Only the groundnut haulms were consumed in much higher quantities than expected from the in vitro D.M.D. A high palatability might have influenced this. Prices of concentrates were high in
comparison with the resulting weight gain. Profitable fattening on these concentrates is hardly possible and certainly impossible on the grass hays. There was no advantage of crosses bred over the locals on this level of feeding.

LIVE PERFORMANCE AND CARCASS TRAITS IN WEST AFRICAN SHEEP

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OVER 300 ewes of a flock of West African Dwarf sheep on the University of Ibadan farm were used to determine lambing performance of ewes and the growth pattern from birth to maturity. A sample of 33 ewes and 13 rams was slaughtered to obtain carcass data. Ewes had their first lamb when they were 20 months old (generation interval). However, 2/3 of them had lambed by 15 months. Per 100 ewes, 145 lambs were born alive, among which 55% were twins and 8% triplets. On the average, a ewe will lamb three times within two years. Mortality of lambs to one year was 20%. Birth weights averaged 1.6 kg with a heritability of 0.12 ± 0.042. Average daily gain from birth to 3 months was 84 g, from 3 months to 1 year 29 g. Among four different age groups of slaughtered animals ewes between 2½ and 4 years of age showed the greatest carcass merit. Their average live weight was 19.4 kg with a carcass yield of 43.6%. Primal cuts including shoulder, rack, loin and legs made up 85% of the children carcasses. The average backfat thickness was 5.8 mm. in this group and the loin eye area measured 8.5 cm². A large number of carcasses had no measurable backfat, no visible fat cover nor internal fat (kidney fat and mesenteric). Of 13 young rams 15 months of age organ weights were taken; The average weights were: kidneys 55.4 g, lungs 234.4 g, liver 297.0 g, heart 82.2 g, spleen 26.8 g and testes 113.4 g. Carcass composition was determined by separation of 10 chilled halves, yielding 68.2% lean, 7.4% fat and 24.4% bone (the difference from 100% being tendons etc.).

THE EFFECT OF VARIOUS DIETARY CARBOHYDRATES ON DIGESTION IN THE WEST AFRICAN DWARF SHEEP

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A 4x4 Latin square design was used to show the effect of various dietary components of carbohydrates on digestion in sheep. Eight West African Dwarf wether sheep, 1-1½ years old, weighing 18-23 kg and consisting of 7 fistulated and 7 intact animals, were used. They were maintained on 4 diets made up of a basal diet of hay (Cynodon nlemfuensis plus Centrosema pubescens-) and concentrates. These concentrates were compounded from cassava flour, molasses, rice bran, minerals and urea. The carbohydrate components were separated into cellulose, hemicellulose, starch and water-soluble carbohydrates. The results of these trials indicated differences in the digestibility coefficients of cellulose and hemicellulose of the four rations, but no significant differences were observed for the starch and water
soluble fractions. There were no significant differences in the digestion of carbohydrates by fistulated and non-fistulated sheep. There were significant differences (P<0.05) in the digestible energy components of the different diets. Similar significant differences were obtained for the metabolizable energy components of these rations. The digestible energy energy increased in an almost linear relationship with decreasing amounts of crude fibre, cellulose and hemicellulose and increasing amounts of starch and water-soluble carbohydrates. Alterations in rumen fermentation due to increases in readily digestible carbohydrates such as starch and water-soluble carbohydrates were indicated by decreases in pH, increases in total VFA, and decreases in the molar proportions of acetic acid accompanied by marked increases in propionic and butyric acids.

DIETARY EFFECTS ON THE DIGESTION IN THE RUMEN OF CATTLE, SHEEP AND GOATS

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Five adult animals fitted with permanent rumen cannulae were used for these investigations. They consisted of two Red Sokoto (Maradi) goats weighing 29.9 and 38.1 kg, two West African Dwarf sheep weighing 18.1 and 18.6 kg and one White Fulani (Zebu) steer weighing 385 kg. These animals were first maintained on a basal ration of Cynodon nlemfuensis and Centrosema pubescens for 21 days followed by concent-

rates compounded from cassava flour, mineral salts and groundnut cake or urea at four levels of protein. The concentrates were used as supplements to the basal ration at 0, 10, 17 and 24%. The sampling of the rumen liquor was done twice a day during the last three days of each trial lasting 21 days. Feed intakes, ruminal pH, total and individual volatile fatty acids (VFAs) were measured. The results indicated that supplementation of the basal ration with the concentrates brought about the increasing levels of total VFAs in the three classes of livestock although there were some tendencies for these to be higher in the steer than in the goats or sheep. However, there were no appreciable differences in these animals with respect to the production of the individual VFAs as well as the ruminal pH. Supplementation of the basal ration with the groundnut or urea-based concentrate or even without any protein concentrate resulted in the significant lowering of the acetic acid levels (P<0.02) with corresponding increases in propionic acid. The lowest molar proportion of acetic acid and the highest molar proportion of propionic acid were obtained with the 17% protein concentrate. Supplementation of the basal ration with the concentrates showed increasing production of the n-butyric and iso-butyric acids in the rumen. While the increasing levels of the protein or urea in the concentrate resulted in significant increases in the iso-butyric acid production (P<0.05), the differences in the production of n-butyric acid were not significant (P<0.02). However, the basal ration produced neither iso-butyric acid nor n-valeric acid in the rumen. N-valeric acid production (about 3%) was only with the 24% groundnut cake protein.