ANIMAL BREEDING IN NIGERIA

Die landwirtschaftliche Tierhaltung in Nigerien

La production animale au Nigéria

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Introduction

On the continent of Africa more than 40 new nations have sprung up since 1960, among which Nigeria is the largest with more than 60 million people. Her area covers nearly 900.000 square kilometers reaching from 4° to 14° North latitude. She can be roughly divided into humid tropics extending over about 1/5 of the country and dry tropics extending over 4/5. The climate is typically two season with a rainfall during the wet season (April through September) ranging from more than 3500 mm in a small strip of mangrove forest along the Southern coast line to 500 mm in the Northern third (Savannah and Sahelian sub-Sahara); and from 500-600 mm to nil during the dry season (October through March). Temperatures vary 25 to 35 °C on the average.

More than 80 % of the people are engaged in agriculture most of which is not modernized in any way. Emphasis is on crops; in 1960 for example the estimated value of relative output of crops was nearly 90 % as compared to 10 % from livestock (Oyenuga, 1967). The livestock population has been estimated for 1972-73 at about 8 1/2 mill. cattle, 29 mill. goats, 20 1/2 mill. sheep, 1/2 mill. pigs and 39 mill. poultry (Dennis, 1974). Expressed differently, there are then per 100 people 14 cattle, 48 goats, 34 sheep and less than 1 pig.

Productivity of livestock

Nigeria suffers from serious shortage of protein, especially of the biologically more valuable protein from animals. Only 1/5 of animal protein recommended in human diets is available. The deficiency is not caused only by a lack of farm

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animal numbers, but more so by the low level of their production. Low productivity can be mainly attributed to incidence of disease and pests, inadequate provision of feed and nutrition for the animals, lack of efficient management, low genetic potential of stock and absence of selection and breeding programs.

In the hot humid South the most feared among the many insects and pests is the tsetse fly causing trypanosomiasis. This has resulted in the practice that 97 % of the cattle, 83 % of the goats, and 76 % of the sheep are raised in the dry North where less feed is available and only a small fraction of the population lives. Cattle is grazed on bush and kraaled during the night. The nomads migrate with the grass away from the dry area towards sources of water. The feed available is of poor quality and in insufficient supply. As a result growth is slow. MITTENDORF (1963) described the growth pattern of cattle as alternating periods of gain and standstill (or even loss) during rainy and dry seasons. After a period of 2 years the net gain of growing cattle was 57 Kg or 78 g per day.

Animals are slaughtered at an advanced age. A large number of them is still trekked on foot over hundreds of miles to the large markets in the South. Dressing percentage of such cattle is often less than 50 %.

ANIMAL BREEDING

Genetic improvement of livestock is usually the last effort to increase productivity, because «until management can be changed by means of quality feeds, more uniform feed supplies and some measures of disease and parasite control, there is no point in planning for genetic improvement» (MCDOWELL, 1972). In most developing countries which are agricultural, it is an almost historical pattern that the veterinarian is the first to improve livestock production, followed by the husbandman and nutritionist. Considerable research has been done on feeding stuffs (OYENUGA, 1968*a*), pasture (OYENUGA, 1966, 1968*b*) and use of native crops in animal rations (OYENUGA, 1961). The results have not always been fully utilized and applied to advantage on a large scale. The prerequisites for an animal breeder can be met, and only recently the first specialists have appeared on the scene.

There is a need for trained animal breeders. For example, livestock improvement projects conducted by every one of the twelve States Agricultural Ministries lack a breeder. Among the six Universities in Nigeria four have Agricultural Faculties of which three share four animal breeders among them. Animal breeding, applied genetics and its usefulness in livestock improvement is neither appreciated nor really understood. Breeding in most cases is random mating. Young are not weaned, sexes not separated, selection not practiced. In the Animal Science Department of the University of Ibadan, the number of students graduating with a major in breeding and physiology of reproduction was only 4 in 1970, then 11 in 1971, increasing to 18 in 1972 and 20 in 1973.

Over the years many data have been recorded for native and foreign stock. They have usually not been used in selection. Identification of animals and tracing of relatives is not always easy. However, whatever information has accumulated should be analyzed. Very little has been done to assess the potential of indigenous stock. It is generally conceded that their production is too low so that there is

no point to improve them and that they should rather be replaced by foreign breeds. However, native breeds should be evaluated under 1) natural harsh conditions and 2) in an improved environment. Imported stock should be investigated as to how well they adapt to the tropical environment. Performance of indigenous stock when provided for must then be compared with the performance of the genetically higher producing imports under less favorable circumstances. Indigenous farm animals must be assessed before genes which perhaps only they possess are irretrievably lost (DETTMERS, 1972); and their possible genetic worth should be utilized before it is too late (TURNER, 1966). With such knowledge intelligent selection and breeding programs can be divised.

NIGERIAN FARM ANIMALS

Dairy cattle (Dual purpose).—There are four cattle breeds which can be considered the best milkers among Nigerian breeds: the Chad Kuri near Lake Chad, the Sokoto Gudali in the Northwest, the Shuwa Arab in the Northeast of the country, and the White Fulani throughout the Northern Guinea Savannah (HILL, 1964). The Kuri and Gudali are the best (Table 1). They are, however, small

TABLE 1

AVERAGE MILK YIELDS OF NIGERIAN «DAIRY BREEDS»

Breed	Yield, Kg	Lactation days	Daily yield, Kg
Chad Kuri	1260	280	4.50
Sokoto Gudali	1094	251	4.36
Shuwa Arab	1040	296	3.51
White Fulani	1022	296	3.45

populations confined to their ecological niches and do not do as well when removed from their «natural environments». The most widely spread White Fulani (*Bos indicus*) rank fairly high in milk production among other indigenous breeds (OLALOKU *et al.*, 1971). On the average, cows reach mature weights of 340 Kg and bulls of 450 Kg between 6 and 8 years of age. White Fulani cattle at two multiplication centers with improved management weighed 300 Kg with 2 ½ years and more than 320 Kg when 3 years old (WHEAT and BROADHURST, 1968). The first calf is born when the dam is 3-4 years old, average birth weight is 20 Kg. Mortality up to one year may reach 40-50 %, and lactation length varies a great deal (OYENUGA, 1967). Cows are milked by hand with the calf present. Under somewaht improved conditions at the University of Ibadan age of dams at first calving is 46 months, birth weight of calves increased to 25 Kg, and death losses are lower (20-25 %). No selection has been practiced in the past, so that milk yield has decreased compared to the foundation stock's performance as reported by HILL (1956), shown in Table 2. The White Fulani at Shika, Nigeria, from which the Ibadan herd derived had a large variation (CV = 50 %) in lactation length, which was highly correlated with milk yield ($r = 0.9$) and with a repeatability

TABLE 2

MILK YIELD OF WHITE FULANI AT THE UNIVERSITY OF IBADAN IN 1950-55 AND 1972

Trait	1950-55	1972
Total milk yield Kg/ days	1636/339	959/235
Maximum yield	2954	2954
Minimum yield	906	82
Daily yield, Kg	4.8	3.7
Calving interval, days	429	438

of $R = 0.5$. This suggests that cows with short lactations must be culled. Heritability estimates of birth weights were 0.25 ± 0.125 (ROBERTSON, 1950) and 0.19 ± 0.15 (FOSTER, 1960) for Shika and 0.28 ± 0.32 for Ibadan (OLALOKU *et al.*, 1971), and for weight at 2 years only 0.19 ± 0.108 (ROBERTSON, 1950). Repeatability for daily milk yield was high both for paired lactations and consecutive records ($R = 0.51$ and 0.77) for the Ibadan herd further suggesting that culling of the poorest producers should be done early (OKOYOMO and DETTMERS, 1973). Over a period of 30 years the production of milk by the Shika herd showed a 1 % genetic gain (FOSTER, 1960). But with a total gain of only 900 Kg the annual gain of 30 Kg is small. At Ibadan, with improved conditions and selection based on milk yield and lactation length, genetic progress can be expected and eventually the indigenous cows' potential and limits determined.

Milk production can be considerably increased by crossing the White Fulani cows with Friesian bulls. At Vom, Nigeria F_1 cows exceeded their zebu dams' milk yield by 38 % in the first and by 68 % in the second lactation (ARMOUR *et al.*, 1961). Crossbred progeny from Friesian bulls and White Fulani cows at Agege, Nigeria, have been reported to produce between 1300 and 1800 Kg in 305 days (HILL, 1964). In 1970-71 crossbred cows at Shika had a longer lactation and a higher milk yield. Birth weight of calves increased, and final weight in the feed lot was reached earlier (Table 3). However, three crossbred animals died before one year old and none of the Fulani (IAR, 1971). F_1 cows had their calves on the average with 27.5 months of age (KNUDSEN and SOHAEL, 1970). At Vom, Nigeria F_1

TABLE 3

COMPARAISON OF WHITE FULANI COWS AND THEIR FRIESIAN F_1 DAUGHTERS, SHIKA STATION 1970/71
(After IAR, 1971)

Trait	White Fulani	F_1	F_1-WF	% advantage
Days of lactation	196	258	62	31.6
Milk yield, Kg	760	1576	816	107.4
Daily yield, Kg	3.9	6.15	2.25	57.7
Birth weight, Kg	23.5	27.5	4	17.0
Age at weight of 73.5 Kg, months	13.7	10.8	2.9	21.2

cows milked 1688 Kg and backcrosses to Friesian gave 1623 Kg, when they were born from dams which had been naturally served, but 2315 Kg from dams artificially inseminated with semen obtained from abroad. Furthermore, purebred Friesian cows bred and raised at Vom averaged 1462 Kg milk as compared to 2550 Kg produced by imported ones (KNUDSEN and SOHAEL, 1970). No heterosis was observed in these crosses, in none of the traits did they excel the average of parent breeds. But the point is that purebred cattle from the temperate zones are expensive to obtain and difficult and costly to maintain, and encounter usually great losses — while a considerable increase in milk yield can be attained at comparably low cost by a top cross (preferably by A. I.) or upgrading (an additional backcross).

Beef cattle.—Among the Nigerian beef cattle the Ndama, a small brown humpless cattle with considerable tolerance to the tsetse fly is the most important. In general, their weights are 300-500 Kg for bulls and 250-270 Kg for cows when they have reached maturity between 6 and 8 years (OYENUGA, 1967). This breed of cattle can be reared in the South of the country, and it has been demonstrated that live weights of 320 Kg can be attained in 3 ½ years when kept on range of experiment Stations (HILL, 1964). Ndama cows on the University of Ibadan farm showed a continuous daily gain when they received some supplementary feed during the dry season. Gains over a two year period including one dry season without extra feed was 74 g/day (DETTMERS, 1973). On experimental improved grass/legume pasture Ndama gained over a 2 year period from 150-240 g daily (OKORIE *et al.*, 1965).

The best information available on performance of Ndama cattle is from Sierra Leona (TOUCHBERRY, 1967). Cows' average age at first calving was 39.4 months, their calving interval 467 days. On the average, Sierra Leonian Ndama are smaller than the ones in Nigeria (HILL and UPTON, 1964). Their weights at different ages are shown in Table 4. Heritability ranged from 0.07 to 0.21 for the different weights. It was postulated that with selection at one year of age approximate genetic gain would be 5.8 Kg per generation or 820 g per year. Animals slaughtered at 39.1 months of age weighed 232.5 Kg, and the yield was only 41.6 %.

TABLE 4

LIVEWEIGHTS (KG) OF NDAMA CATTLE AT DIFERENT AGES COMPARED WITH WHITE FULANI DUAL PURPOSE CATTLE

Age in months	Ndama in Sierra Leona	Ndama in Nigeria	White Fulani
0	16.8	17.7	22.2
3	48.6	—	73.1
6	75.8	86.3	130.4
9	95.8	—	—
12	103.1	140.7	187.3
18	127.6	183.9	238.6
24	158.4	220.2	286.7
30	189.7	249.7	299.7
36	209.3	263.3	321.6
48	230		

TABLE 5

REPRODUCTION OF NIGERIAN SHEEP

Breed	Lambings per ewe/year	Lambs per 100 ewes	Twinning rate %	Lambing interval, days
Yankasa	1.46	176	25.0	236
Uda	1.27	134	14.1	270
Dwarf	—	145	63.0	248

To increase weights and/or milk production to enable cows to raise a bigger calf, Ndama cows were crossed with German Brown bulls on the University of Ibadan farm. Crossbred progeny exceeded the Ndama on the average by between 20 and 30 % in live weights from birth to 16 months of age. This agrees well with crossbreeding results obtained in Zaïre with an average superiority of 28.9 % in weights from 1-5 years for Brown Swiss-Ndama crosses over the indigenous breed (COMPÈRE, 1960). Crosses of Ndama with Jerseys in the Ivory Coast were on the average 17 % heavier up to 3 years of age and produced 20-30 % more milk than the Ndama (MATHON *et al.*, 1970).

Sheep.—Nigerian hair sheep (HILL, 1964) include the Northern long-legged, large breeds Yankasa and Uda (Ouda) and the Dwarf in the Southern area of the country. In the North, they are managed in the same way as cattle, herded in large flocks with random all year round breeding and the majority trekked or shipped to the South for slaughter. They have an excellent reproductive performance (FERGUSON, 1964), as shown in Table 5. These traits were improved by crossbreeding of Uda ewes with Merino rams. Crosses were inferior when Yankasa ewes were used. The Yankasa excel the Uda in lambing percentage and twinning rate, while the Uda grow somewhat faster and reach higher live weights for age (Table 6). The M × Y crosses exceeded the Yankasa by 2.6 to 16.6 %, the superiority increasing as the animals grew older, while the M × U crosses were superior at earlier ages. Dressing percentages are 41 % and 38 % for Yankasa and Uda respectively, and 40 % for both kinds of crosses when slaughtered at 1 year of age (FERGUSON, 1964).

The most widely spread breed of sheep in the Southern regions with a large distribution along the coast of West Africa up to Ghana is the West African Dwarf of almost half the size that of the Northern breeds. A herd of 300 ewes is maintained at the University of Ibadan under improved conditions of grazing and supplementary feeding. However, year round random breeding and no selection has been practiced.

The West African Dwarf is tolerant to trypanosomiasis and is said not to respond to extensive (range) management (HILL, 1964). They are a principal source of meat and roam freely in towns and villages fending for themselves. HILL (1960) reported live weights at 9-12 months of age between 14-18 Kg, and of 22-28 Kg at maturity, 2-3 years (Table 6). Age at first lambing was between 11 and 14 months, 90-120 % lambing and 20 % lambs being twins. A recent assessment of the University flock (DETTMERS and LOOSLI, 1974) showed that reproductive performance exceeded the earlier report (Table 5). Although average age at first

TABLE 6

BODY WEIGHTS (Kg) OF NIGERIAN SHEEP AT DIFFERENT AGES

Breed	Age in months							
	0	3	6	12	18	24	36	48
Yankasa	3.5	14.3	18.7	24.9	33.9			
Uda	3.7	15.2	21.5	29.4				
Dwarf	1.7	8.1	11.8	17.3	20.7	24.2	27.8	33.4

lamb was older, 2/3 of the ewes had their first lamb by 15 months. Twinning rate increased with lambings from 35 to 71 % and lambing interval shortened from 277 to 209 days. NGERE (1973) reported for Dwarf sheep (Forest type) in Ghana a yearly lambing of 171 % and twinning rate of 87 % for 45 ewes which lambed out of 47 (96 %). At Ibadan, carcass yield in Dwarf sheep was about 43.6 % for ewes slaughtered between 2-4 years of age decreasing to 40.9 % with ages older than 5 years. Ewes below 2 years dressed 42.9 %. Rams slaughtered at about 15 months had a 39.3 % yield with live weights less than 4 Kg lower than animals 37 months and older showing that early slaughter is indicated.

Goats.—In spite of its large population and its importance as a source of meat, milk and skins very little is known about the performance of the goat, with the exception of the Nubian goat in North Africa and the East African Dwarf. The latter resembles the Dwarf goat widely distributed in Southern Nigeria. The East African Dwarf reaches 15 Kg body weight when about one year old, but they have been reported to grow twice as fast when put on a good diet (FRENCH, 1970). Dressing percent is given as 37.5 % at 4 Kg live weight and only 35 % at 13.5 Kg. Milk yields of 50-55 Kg in 32 weeks have been reported for crosses of the West African Dwarf with Northern Nigerian larger breeds (HILL, 1960).

Pigs.—Pigs are so few in Nigeria that the first aim should be to increase numbers for fast production of scarce animal protein. A small number of indigenous pigs were compared with imported breeds; they grew slowly, were poor feed converters and yielded fat carcasses (HILL, 1957). With intensive management it appears that among imported breeds the Large White sow is better able to withstand hardships due to heat stress and lack of a standardized environment (feeding and health control). Climatic stress causes high lactational weight loss in sows (STEINBACH, 1971) and reduces growth during the hot season. The larger pigs at birth in smaller litters of the Landrace show a lower mortality than the Large White. The performance of both breeds on the University of Ibadan farm is poor. Over a 3-year period (1970-72) average litter size (pigs born alive) was for the Large White 8.2 and for Landrace 7.5, losses to weaning at 8 weeks of age were 40 and 19 %, while postweaning gain was 172 and 161 g/day. Because of their slow growth pigs finished at lower weights and are fatter when slaughtered at conventional weights. Their carcasses contained 6 % more fat, 1 % more bone and 7 % less lean than reported by other workers (SOFOLUKE and DETTMERS, 1973). But growth rate can be increased by crossbreeding and pigs reach market weight earlier. Crossbred pigs (single and 3-way crosses) were clearly superior in weight

at different ages and in daily gain before weaning and after (ANWANA, 1974). Three way crosses excelled purebreds by 12.5 to 33.1 % in pre-weaning weights and gain and by 11.6 to 38.7 % in postweaning weights and gain. They were superior to single crosses. Yet, pig production units run by Ministries of Agriculture or private operations continue to raise purebred hogs for slaughter.

Poultry.—The most advanced breeding schemes for commercial production are in the poultry industry. Large hatcheries use foreign hybrid strains for egg and broiler production. Parent stock, however, has to be imported continually. At the University of Ibadan native birds are being evaluated as such and in crosses with high producing imported breeds.

SUMMARY

In Nigeria, animal breeding is only beginning, and much education is needed on what it is and how the animal breeder can contribute to livestock improvement. Lack of specialists (breeders and geneticists) requires increased training of University graduates to provide direction for ongoing livestock projects in the country.

The environment for farm animals must be more standardized (disease- and pest control, adequate nutrition, regular supply of feed, improved husbandry) before genetic improvement can be realized.

Available records on production should be used for selection. Indigenous breeds ought to be assessed and imported ones evaluated under tropical conditions.

For commercial production of milk and meat, crossbreeding of native cattle with foreign breeds under somewhat improved management appears to yield greatest advantage by rapidly increasing production yet retaining hardiness of the native breeds at lower cost than rearing imported breeds as purebreds.

To bridge the animal protein gap fast and efficiently poultry and pig production must be increased.

ZUSAMMENFASSUNG

Die landwirtschaftliche Tierhaltung in Nigerien hat noch nicht einen hohen Stand erreicht. Selektions- und Zuchtprogramme könnten zur Hebung der tierischen Erzeugung beitragen. Aber das Verständnis für Züchtung oder angewandte Genetik muss erst noch geweckt werden. Der Mangel an Fachleuten (praktischen Tierzüchtern und Genetikern) ist gross; und sie werden dringend benötigt für eine zielgerechte Durchführung der Projekte im Lande, die sich mit landwirtschaftlichen Nutztieren befassen. Die Umweltverhältnisse müssen wesentlich verbessert werden, wie Gesundheitskontrolle, Bekämpfung von Insekten, ausreichende Tierernährung und verbesserte Haltung. Diese Vorbedingungen müssen erfüllt sein, bevor überhaupt an züchterische Verbesserung gedacht werden kann.

Vorhandene Daten sollten zur Zuchtwahl (Selektion) herangezogen werden. Landrassen und -schläge müssen auf ihre Leistungsfähigkeit untersucht und eingeführte Rassen auf ihre Anpassung an die Tropen geprüft werden. Auf dem

Gebiet der Milch- und Fleischerzeugung scheint Kreuzung von weiblichen Tieren der einheimischen Rassen mit eingeführten Vatertieren (oder durch künstliche Besamung) am schnellsten zum Erfolg zu führen, wenn die Haltung und Fütterung gleichzeitig bis zu einem gewissen Grade verbessert wird. Dadurch kann ein erheblicher Anstieg in Milch- und Fleischleistung bewirkt werden, wobei in den Kreuzungstieren die Angepasstheit, Widerstandsfähigkeit und Genügsamkeit erhalten bleiben, verbunden mit wesentlich geringerem Kostenaufwand im Vergleich mit dem Versuch, eingeführte Tiere rein weiter zu züchten.

Um schnell und wirkungsvoll die Eiweisslücke in der Ernährung der Nigerianer selbst zu schliessen, sollten Hühnerfarmen und Schweinemästereien verbreitet werden.

RESUME

La production animale au Nigéria est peu développée. La zootechnie et la génétique offrent des méthodes à améliorer cette production. Mais, au Nigéria, la zootechnie se trouve encore dans son enfance; il faudra propager ses méthodes et son potentiel. Un manque de spécialistes (éleveurs et zoogénéticiens) demande aux Universités de produire les experts qui développeront les projets zootechniques du pays. Un environnement standardisé, un service vétérinaire efficace, une alimentation suffisante, élevage et exploitation modernes, voilà les conditions du travail zoogénétique.

La sélection s'appuyera sur les statistiques de la production actuelle. Il faudra évaluer, sous les conditions du Nigéria, les races indigènes et importées.

Pour la production commerciale de lait et de viande, le croisement des races indigènes avec les races exotiques a donné des résultats avantageux; en maintenant l'adaptabilité des races africaines, la production fut augmentée. L'aviculture et la production porcine aussi devraient être intensifiées, contribuant ainsi à la solution des problèmes de l'alimentation humaine au Nigéria.

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