BREEDING FOR MILK IN AFRICA WITH PARTICULAR REFERENCE TO THE SAHIWAL STUD IN KENYA

Exploitations laitières en Afrique, avec reference spéciale à l'étable Sahiwal en Kenya

Milchviehzucht in Afrika, mit speziellen Erfahrungen in der Shaiwalzucht in Kenya

K. MEYN *

Introduction

Most of the milk from cattle in Africa is produced by subsistence farmers for home consumption. As a rule, environmental conditions are unfavourable for intensive milk production, due to the climate, inadequate nutrition, the ocurrence of disease, lack of knowhow and lack of capital. Milk yields per cow are very low, and the genetic potential of the indigenous cattle populations is far below that of the dairy breeds originating in Europe. As an example, field surveys in Kenya indicate that indigenous zebu cows produce 150 - 350 Kg milk per year. Under favourable management conditions, these animals are able to produce 900 Kg per lactation (Mahadevan, 1966). A similar genetic potential has been recorded for Sanga type cattle from Uganda. Slightly higher yields may be expected from indigenous cattle breeds along the Mediterranean and the Kenana in the Sudan (Alim, 1960).

History and Current Development

Commercial dairying commenced in the colonial settlement areas early in the century. As a rule, these areas had a favourable climate for European dairy breeds, *e. g.* parts of South Africa, the Kenya Highlands and the fertile parts of Northern Africa. In areas unfavourable for European breeds but with a lucrative milk market, the environment has been changed to meet the requirements of these cattle. Dairy production systems on a high cost/high efficiency basis have evolved.

* Formerly: Ministry of Agriculture, Department of Agriculture, National Animal Husbandry Research Station. P. O. Box 25, Naivasha, Kenya.

Dairy development in the post colonial era has favoured the spread of high yielding European dairy cattle to medium and small scale farmers in the temperate areas of the continent. Although yields fall far below recorded levels in the developed countries, they are definitely superior to the yields of indigenous cows. Recent surveys on smallholdings in Kenya report yields of 1350 Kg milk per grade cow and year. These cattle have fifty or more percent blood of a European dairy breed, mainly Ayrshire, Friesian, Guernsey and Jersey. One may expect an increase in yields with rising knowhow in management and feeding.

Subsistence Dairying

In large parts of the continent the climate will only permit satisfactory production with European dairy cattle at high levels of management coupled with high capital inputs to change the environment to the requirements of the cattle. However, the majority of stockowners will be unable to raise the capital or acquire the expertise to make such intensive production system viable. To improve the living conditions of the millions of subsistence dairy farmers and pastoralists, cattle are needed which can perform satisfactorily under extensive management and adverse climatic conditions, and which can survive times of nutritional stress. The prime objective is to feed the local population, with the possibility to market surplus production.

None of the indigenous and European cattle populations are suitable for this purpose. Among the well adapted indigenous cattle the gene frequency for milk production is too low. European dairy cattle cannot realize their genetic potential due to environmental stress. The development of adaptable dairy breeds from crossbred foundations appears to be logical. Such attempts are scarce, *e. g.* the Thibar cattle in Tunisia and the Holmonger in South West Africa. Neither of them has reached proportions to make a major impact.

Breeding work in other countries, *e. g.* Kenya, Tanzania, Zambia and Zaire was based on the introduction of dairy zebus from the Indian subcontinent, which were known to be adaptable to tropical conditions but performing better than indigenous cattle. While Tanzania started to develop new composite breeds from East African and Asian zebus as well as European dairy breeds (Mpwapwa, Tanga), Kenya upgraded the indigenous zebu on Livestock Improvement Centres with Sahiwals from India and Pakistan. Changes in policy have prevented the Tanzanian effort to become fully effective, although selection of Mpwapwa cattle still continues. The development of a taurindicus dairy breed at Tanga has been discontinued in favour of upgrading to the Sahiwal.

Breeding work in Kenya

The introduction of Sahiwals from Pusa/India in 1939 ended the attempt to select an improved indigenous dairy zebu for the smallholders of the Kenya Highlands. Sahiwal crosses clearly outyielded the indigenous zebu, halfbred Sahiwals being 55 percent and threequarterbred Sahiwals being 64 percent superior (Mahadevan *et al.*, 1962).

Later evidence proved that in the fertile Highlands higher yields than from

Sahiwals could be obtained from European dairy cattle or their crosses with the Sahiwal (MASON, 1965). Smallholders have proven that they are able to keep European cattle. The number of «grade» dairy cows has risen to almost 500,000. Recent work by KIMENYE (1973) and MEYN and WILKINS (1973) indicates that crosses of European dairy breeds with the Sahiwal outyield their purebred herdmates of either breed in the hot, humid coastal belt and in the semi-arid areas of the Highlands. At Kilifi Plantations Ltd. on the Kenya Coast, lactation milk yields and calving intervals for Ayrshire, 3/4 Ayrshire, 1/4 Sahiwal and 1/2 Sahiwal, 1/2 Ayrshire cows were 3024, 3151 and 3004 Kg, and 424, 405 and 404 days, respectively. First lactation milk yields at Ngong Livestock Improvement Centre in the semi-arid Kenya Highlands were 1519, 2152, 2233 and 2466 for Sahiwals, Ayrshires, Ayrshire/Sahiwals and Sahiwal/Ayrshires, respectively.

An extrapolation of these findings into the arid zones led to the hypothesis that these areas would hardly meet the nutritional needs of crossbred cattle with European breeds, and that an improved zebu with lower feed requirements, a better adaptation to drought conditions and a lower production potential than crossbreds — but superior to the existing population — would be more suitable. Indigenous zebus have — as a rule — an undesirable milking temperament, as they don't let down their milk in the absence of their calves.

The Sahiwal is considered as a suitable dual purpose dairy/beef animal to replace the indigenous zebu. Despite its superiority over the latter, shortcomings have been observed in respect of the milk let-down in the absence of a calf, but rapid progress in selection has been made. An improved dairy zebu with a desirable milking temperament and a high gene frequency for milk production is also needed for crossbreeding programmes with European breeds in the semi-arid and coastal areas. A criss-cross breeding system with a European dairy breed and the Sahiwal may be regarded as most practical. If the breeding female has a hump she will be mated by a humpless bull while a humpless female will go to the Sahiwal. The formation of a new composite dual purpose breed for this zone is undesirable because of changing environmental and economic conditions as well as the burden of organizing one additional breeding programme.

THE NATIONAL SAHIWAL STUD

The formation of the National Sahiwal Stud at Naivasha in 1962 was the start of a scientific breeding programme for a dual purpose zebu breed to be kept under extensive pasture conditions, but under good management. A progeny test programme for milk production commenced in 1965 following MASON's recommendations. The current breeding programme operates since 1968.

The main objectives are:

— to develop a management system for extensive dairying in a semi-arid environment;
— to make genetic progress for milk and beef production;
— to supply progeny tested bulls to the Central Artificial Insemination Station;
— to supply breeding stock for range development areas (*e. g.* Masailand).

The stud consists of 500 cows plus followers, a total of about 1300 head. All

BREEDING PLAN

at the

NATIONAL SAHIWAL STUD

Naivasha/Kenya

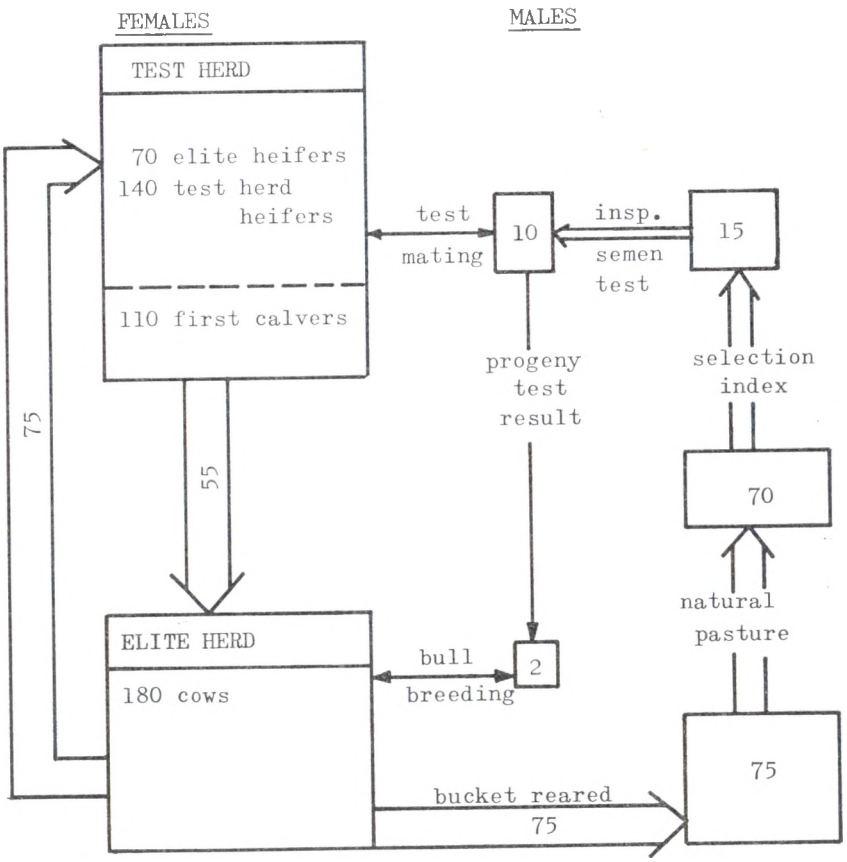

FIG. 1.

heifer calves born are reared with whole milk to 55 Kg, and receive early weaning pencils to 125 Kg. Bull calves are reared in the same way, their number depending on market demand. After 125 Kg liveweight bulls and heifers are kept separately on natural pasture. Heifers are inseminated at 27 months when they weigh 307 ± 37 Kg. Bulls are selected for progeny testing once a year, when their average age is 24 months. They are then intensively fed until 200 doses of semen have been collected. After a four year's lay off period on natural pasture they are

either sent to the Central Artificial Insemination Station for semen production or they are disposed of.

Eight weeks before calving pregnant heifers enter the milking herd to get acquainted with the new environment and to be steamed up. After calving they are milked twice a day until they are dried off after 305 days. Cows are expected to yield 4.5 Kg milk/day in the dry season and 9 Kg milk/day in the wet season without supplementation. Higher yielding cows receive 1 Kg concentrates for each additional 2.5 Kg milk produced.

A diagramme of the breeding programme for milk and beef is given in figure 1. 210 heifers enter the milking herd every year. The higher yielding 110 heifers are allowed a second lactation, after which the best 55 cows over the first two lactations are selected to stay in the herd. After that hardly any culling is done on yield.

Heifers and first calvers are inseminated by semen from test bulls, while all cows calving for the second and later times — the so-called elite herd — are inseminated with semen of proven bulls to produce the next bull generation.

The 180 elite cows produce 150 calves, i.e. 75 bull calves per year. About 70 bulls survive the bucket rearing period and a range performance test for growth rate to an age of two years. Then the 15 best ones are identified by a selection index comprising the estimated breeding values for milk yield of the sire and dam, and the estimated breeding value for weight for age of the young bull itself. An inspection of the selected bulls and their dams for psysical faults, muscling, udder conformation and teat shape eliminates three more bulls. The remaining twelve are tested for semen quality, leaving about ten for test mating. The aim is to produce fourteen milking daughters per test bull.

Average daily gains to weaning, bulling heifer weights, 30-day milk yields and 305 day yields of the first lactation are analysed by contemporary comparison. First decisions on bulls are made when the 30-day yields are available. Bulls with outstanding daughter yields are sent to the A. I. station for semen production, while all of the remaining bulls are kept on. Final decisions are made on availability of the 305-day milk yields. Two bulls are selected annually for the A. I. station and for use in the elite herd. The remainder is sold for natural service or for slaughter.

TABLE 1

AVERAGE LACTATION LENGTH (DAYS) AND MILK YIELD (KG) AT THE NATIONAL SAHIWAL STUD

Year	First Lactation			Second Lactation			Third and later Lact.		
	n	lact. length	milk yield	*n*	lact. length	milk yield	*n*	lact. length	milk yield
1968	233	250	959	106	260	1175	353	266	1317
1969	182	255	1011	88	286	1534	176	290	1763
1970	171	261	1057	74	296	1770	154	297	1934
1971	224	245	1143	70	299	1769	180	292	1910
1972	144	277	1306	125	271	1689	187	286	1840

Milk yields in the herd have increased rapidly over the last five years, largely due to heavy culling and improved milking temperament (see Table 1). From 1968 to 1972 the overall herd average increased from 1,175 Kg to 1,630 Kg milk per lactation, a 39 % increase in five years.

The environment and management has remained fairly constant during this time. Genetic progress in terms of milk yield may be expected at 3 to 4 per cent per year.

The demand for Sahiwals from the range areas of Kenya and from abroad has risen sharply in recent years. Semen or breeding stock have been exported to Tanzania, Zambia, Uganda, Burundi, Ruanda, Zaire, Somalia, the Seychelles and Bangla Desh. There are plans to increase the number of Government-owned Sahiwal herds and to include them in the breeding programme. Genetic progress could then be faster. It is also hoped that breeding stock can be exchanged with dairy zebu herds in other countries, e. g. India, Pakistan, the Sudan, Niger, Tanzania, etc.

SUMMARY

A brief account is given of the development of a dairy industry and the attempts to breed adapted dairy cattle in Africa. The paper also describes the cattle breeding policy for the semiarid and arid pastoral areas of Kenya and the selection programme at the National Sahiwal Stud at Naivasha. Over the last five years milk yields increased by 39 %, from 1175 to 1630 Kg per lactation, mainly due to selection. Further rapid increase in yields may be expected.

RESUME

Il y a un court travail sur le developpement de l'économie du lait en Afrique et sur l'évaluation de l'élevage de races, de bétail laitier. La politique d'élevage des boeufs pour les régions semi-arides et arides du Kenya et le programme d'élevage dans le «National Sahiwal Stud» sont également décrits. Pendant les cinq dernières années, les productions du lait ont pu être augmentées d'environ 39 %, de 1175 à 1630 Kg par lactation. Cette montée est surtout à attendre comme succès de sélection. Une ascension rapide ultérieure dans la production du lait est attendue.

ZUSAMMENFASSUNG

Es wird ein kurzer Abriß gegeben über die Entwicklung der Milchwirtschaft in Afrika und die Ansätze zur Züchtung angepaßter Milchviehrassen. Die Rinderzuchtpolitik für die semi-ariden und ariden Weidegebiete Kenyas und das Zuchtprogramm im «National Sahiwal Stud» werden ebenfalls beschrieben. Während der letzten fünf Jahre konnten die Milchleistungen um 39 % gesteigert werden, von 1175 auf 1630 Kg je Laktation. Dieser Anstieg ist hauptsächlich als Selektionserfolg zu werten. Ein weiterer schneller Anstieg in der Milchleistung ist zu erwarten.

LITERATURE

1. ALIM, K. A. (1960): Reproductive rates and milk yields in Kenana cattle in the Sudan. *J. Agric. Sci.*, 55, 183-187.
2. KIMENYE MUTUNGA, D. (1973): *Comparison of Ayrshire X Sahiwal crossbred cows with high grade Ayrshires on Kilifi Farm, Coast Province of Kenya.* M. Sc. Thesis, Nairobi, 95 pp.
3. MAHADEVAN, P.; GALUKANDE, E. B., and BLACK, J. G. (1962): A genetic study of the Sahiwal grading-up scheme in Kenya. *Animal Production*, 4, 337-342.
4. MAHADEVAN, P. (1966): Breeding for milk production in tropical cattle. Tech. Communication, No. 17. *Commonwealth Bureau of Animal Breeding and Genetics*, 154 pp.
5. MASON, I. L. (1965): *Report to the Government of Kenya on the National Sahiwal Stud.* F.A.O. Report. No. 1965, 27 pp.
6. MEYN, K., and WILKINS, J. V. (1973): *National Cattle breeding programs in Kenya.* Paper presented at the III World Conf. Animal Production, Melbourne, 1973, 5 (e), 1-10.