

CONCLUSIONS

The main objectives as set out in the original research protocols have been achieved:

1. CROSSBREEDING FOR MILK PRODUCTION

Crossbreeding Saanen and South African Indigenous goats to achieve adequate levels of milk production for subsistence purposes was successful. Although the Crossbreds produced less milk than pure Saanens, the amount of milk and the duration of lactation was much closer to that of Saanen than of Indigenous goats. The average daily yields were adequate for the needs of householders and subsistence farmers. Upgrading by breeding Crossbred goats to a Saanen male resulted in Three-quarter Saanens which had yields similar to those of the Crossbreds.

2. CROSSBREEDING FOR RESISTANCE TO HEARTWATER

South African Indigenous goats were shown to have a genetic resistance to heartwater, and this resistance was transmitted to a large proportion of Crossbred goats (about half). These results give hope that the Crossbred goats can be used for small-scale milk production in areas where heartwater is an important disease.

3. CROSSBRED GOATS FOR MILK PRODUCTION IN SOUTH AFRICA

This study has shown that Indigenous female goats can provide the basis for milk production by householders or small-scale farmers in developing areas by crossing them with Saanen males to produce female Crossbred milk goats. This would make it possible to develop goat milk production schemes rapidly and economically, using resources already available in these areas. Further upgrading towards the pure Saanen would probably be a disadvantage, especially in view of the low resistance to heartwater of the Three-quarter Saanen. The development of a new synthetic breed might not be necessary if Indigenous goat herds can provide a source of females for crossbreeding.

4. MANAGEMENT OF MILK GOATS IN SOUTH AFRICA

Many aspects of management were developed which will have application to the success of a wider introduction of milk goats in South Africa. In the process, many aspects were identified which require further research. These include the following:

*** 4.1 Kid mortality**

This was the most significant disease problem affecting the goats. Further research is needed to identify the causes and develop management strategies to eliminate the problem.

Although lack of colostrum and poor mothering ability contribute to kid mortality, the greatest problem identified was diarrhoea. This was presumed to be caused by coccidiosis, but this has not been proved, and the possibility of other causative agents cannot be excluded. For example, the role of rotavirus in diarrhoea of goat kids needs to be examined more thoroughly.

*** 4.2 Heartwater**

The proof of genetic resistance to heartwater is only the first step. The programme should be extended to develop a resistant breed of milk goats. This would require facilities and resources beyond those available at present.

*** 4.3 Resistance to Parasites**

The resistance of South African Indigenous and Crossbred goats to internal and external parasites should be measured. It seems likely that these goats will be a valuable source of genetic material that could be used to contribute traits of hardiness like these to other breeds.

*** 4.4 Mastitis**

Mastitis is recognised as one of the most important diseases of dairy cows. A thorough examination of the incidence of clinical and subclinical mastitis is needed, to establish levels of infection, and to assess if the established methods of mastitis control for dairy cows are appropriate for milk goats. There are recognised differences, for example in the levels of Somatic Cell Counts (SCC) (Contreras *et al.* 1997), and an indication that mastitis treatments may behave differently in goats compared to cows (Buswell *et al.* 1989).

*** 4.5 Out-of-Season Breeding**

Marketing goat milk is a specialized activity, since the biggest demand for fresh milk is from people or children who have allergic reactions to cow milk. To supply this market, a year-round production of milk is essential. The seasonal breeding of milk goats is a handicap to the establishment of a commercial milk goat operation. Work done in France promises to make the manipulation of breeding season feasible and sustainable (Chemineau *et al.* 1996). These techniques need to be assessed and adapted if necessary to South African conditions.

*** 4.6 Alternative Feed Sources**

Alternative feed sources must be assessed and developed which will be appropriate and suitable for the different agro-ecological regions of South Africa, with particular application to the small-scale farmer.

*** 4.7 Application of Development to Small-Scale Farmers**

Systems need to be developed, preferably by using such techniques as Farming Systems Research and Extension (FSR-E), so that the concept of using milk goats can be promoted and adopted by the people of South Africa who are in greatest need of such a source of high quality protein. An aspect that was not studied was the acceptability of goat milk by the people perceived to be likely to benefit from keeping milk goats. However, many communities have clearly stated that the drinking of goat milk is, or has been traditional. The introduction of Crossbred milk goats to a limited number of farmers through pilot outreach programmes has resulted an enthusiastic response.

*** 4.8 Nutritional Value of Goat Milk**

The nutritional value of goat milk needs to be evaluated in relation to normal nutritional parameters. In addition, its benefits to adults and children who are allergic to cow milk should be assessed more precisely than has been done.

*** 4.9 Small-Scale Milk Processing Methods**

Methods of processing milk hygienically must be developed which are appropriate for the small-scale producer. This should include fermented milk products, considering the relatively high proportion of the adult population that develops lactose intolerance with maturity.