5 CONCLUSION

The role of animal breeding in development is highly recognised by the Ugandan government, which has made it an important component of its Poverty Eradication Action Plan (PEAP). Unlike other investments, gains made in breeding, though small, are cumulative and for perpetuity. WELLER (1994) is of the opinion that the costs of these programmes are generally minimal as compared to the increased income, or efficiency generated by them.

In Uganda, the dairy industry has proved instrumental in improving the livehoods of vulnerable groups in society. The groups usually receive in-calf heifers to enable them start commercial modes of production. Being a high milk producer, the Holstein-Friesian is often the breed of choice. Its performance in some agro-ecological zones of the country is satisfactory, but, still, its adaptation is a challenge to reckon with. Improving the environment instead of its genotype has, for the past 45 years since its introduction, proved unsustainable. Selection of the breed within the environment its due to perform in, is a plausible solution. LUSH (1945) asserts that variation is the raw material on which the breeder works. This raw material exists within the established Holstein-Friesian population as importation of the breed started some 40 years back, and procurement of its germplasm has been from all over the world. However, carrying out a breeding programme, as is known in the developed world, is difficult given the available resources and infrastructure.

With the publication of NICHOLAS and SMITH's work in 1983, which showed faster genetic gains with the use of Multiple Ovulation Embryo Transfer (MOET) in open nucleus breeding schemes (ONBS), many geneticists thought this to be the answer for animal breeding in the developing world. FAO even included it in its priorities in the field of livestock improvement in developing countries. A number of theoretical studies (e.g., KAHI et al, 2004b; KASONTA et al., 1990) on its use in Africa, have also shown that remarkable genetic gains might be expected if implemented. 20 years after NICHOLAS and SMITH's publication, they are hardly any success stories in Africa on its use in cattle. The few ONBS mainly deal with indigenous cattle and without the MOET component. Since MOET would be carried out in the nucleus environment circumventing problems like those associated with use of AI in the field, it was hoped that this technology would revolutionalise breeding in this part of the world. Unfortunately, this has not been the case. Even where its use has been tried, like at NAGRC which is well equipped and has trained staff in the technology, the results have been disappointing.

The intriguing questions: why this grim picture, when most of the studies show otherwise? Is it lack of an enabling policy environment in which ONBS could be implemented? Are the parameters used in the studies over-optimistic? What limits the use of MOET? The barrage

of questions could go on and on. In spite of all this, ONBS seem to be the most practical solution to animal breeding in Africa, with or without MOET. This is mainly due to lack of basic infrastructure needed for production and pedigree recording for the sustantial part of the animal population, and the situation is not expected to improve in the foreseeable future. Therefore, Uganda's Animal Breeding Policy (MAAIF, 1997b) highly recommends its use in livestock improvement programmes.

Without data from the herd/milk recording scheme (HRS), it would have been very difficult to carry out this study. This clearly shows the need to promote record keeping if science-based systematic breeding work is to be done. Owing to cessation of donor funding to HRS, recording activities have slackened. Sustainability issues of breeding operations like HRS and AI after donor funding ceases, need to be seriously addressed. These two operations are a core part of the scheme which has been recommended to NAGRC for implementation, hence any shortcoming in them would be a set-back to the programme.

In terms of climate, Uganda has a comparative advantage over Kenya, which could mean that exotic breeds would do better in Uganda. Comparison of results got in this study with studies made in Kenya (OJANGO, 2001; REGE, 1991), however, give another picture. This can largely be explained by market-oriented dairy farming having started almost 50 years earlier in Kenya, with the European settlers, than in Uganda. Thus, the longer experience of Kenya is reflected in its having better breeding coefficients (see table 4.2) than Uganda.

Regional cooperation, for example with Kenya, would enable sharing and efficient use of resources e.g., data processing personnel, computer hard- and soft- ware; selecting from a larger Holstein-Friesian population, which would bring in more genetic gain etc. SMITH and BURNSIDE (1990) are of the view that the partitioning of the European dairy cattle populations by country, with limited exchange of genetic material across countries, has restricted full use of the best European sires in the past. A mistake which should not be repeated by developing countries. National governments in developing countries should work together in those aspects of genetic improvement and conservation in which they have common interests and which are amenable to joint action.

The study revealed a need to simultaneously improve the reproductive, nutritional, and health management of animals if genetic gain is to be fully exploited. The triangle is the strongest (FAO, 1993) structural form in livestock development, which becomes weak and vulnerable without all its sides. Its sides are made up of: animal nutrition, animal health and genetic potential. Development can start with any of the three sides, but, soon, must pay attention to the other two sides.

In agriculture the cost of reseach, to a large extent, is borne by governments, and individual farmers are able to benefit without having to divert their own resources in this direction (Weller, 1994). This is also true of animal breeding in developing countries. This sector

cannot be wholly left to market forces, hence government intervention in form of funding some of its activities, like the recommended scheme especially in its initial phases, is indispensable.

The total economic approach to development of the recommended scheme has clearly been demonstrated by a lot of farmers in the base population with one or two cows, who do not invest in the programme, and who are the main target group of the Poverty Eradication Action Plan as being the major beneficiaries of improved genetics that would accrue from implementing the scheme.