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GOAT PRODUCTION SURVEY - FUNDAMENTAL ASPECTS TO MODEL GOAT PRODUCTION SYSTEMS IN SOUTHERN AFRICA

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Abstract

Computerised modelling and information technology are extremely useful in livestock production systems. In many instances the complex nature of intensive and extensive production systems alike require complex analyses in order to obtain the most useful combination of production factors. These include a complex matrix of common production factors like various production and reproduction characteristics.

Indigenous communal goats give birth for the first time at approximately 17 to 18 months of age. Does conceive at a relatively low condition score and their average litter size is 1.7 kids per doe. Kidding intervals were approximately 238 days with the highest kidding rates in autumn (96 %), spring (93%), winter (63 %) and none in summer (0 %). The mortality rates of goats in communal systems are extremely high (40.62 %) compared to systems with better management (<5%). The mortality rates result from theft, poor hygiene, and predation. Breeding is not controlled, does run with bucks the whole year and consequently they breed all year round. Computerised modelling make it possible to emphasis the most useful combination of factors that will contribute most to improving the production system depending on the availability of funds and other inputs.

INTRODUCTION

Livestock production is the most important agricultural activity in most of the countries in Southern Africa. The breeding strategy followed in Southern Africa, in general, depends primarily on the environment and level of management. As far as the environment is concerned, livestock production is often practiced under unstable and hazardous conditions, and further complicated by bush encroachment and occasionally desertification. In addition, the producers vary from sophisticated commercial to communal subsistence producers (Scholtz et al, 1998)

The important role of goats in traditional areas is well documented (Devendra et al, 1970, Devendra et al, 1980, Wilson, 1988a and 1989b). Goats, like cattle, have played an important role in the livelihood of rural people in Mpumalanga in South Africa. Indigenous goats are more common in the communal areas than the improved Boer goats, which are mostly found in the commercially owned farms. These local goat breeds constitute valuable sources of genetic material because of their adaptation to harsh

climatic conditions, their ability to better utilize the limited and poor quality feed resources and their resistant to a range of diseases such as pulpy kidney, gall sickness and internal parasites.

Goats play an important socioeconomic role in rural areas and women who are among the most resource poor farmers in Africa. They are prolific and require low inputs for a moderate level of production, reach maturity early and are profitable to keep (Devendra and Burns, 1980).

Although there is now a considerable body of published research on indigenous types of small ruminants in tropical areas of Africa, much of the work published has the disadvantage of having been carried out under controlled conditions at research stations and the results may not reflect the actual situation of small scale production systems prevailing in rural areas. Thus it is necessary to study the performance and limitations of these breeds in existing rural conditions in order to recommend strategies for their improvement.

There is only limited information available on small-scale goat production in the developing areas of South Africa. This paper focuses on the fertility status of indigenous goats in Southern Africa, as well as the constraints and potential for improvements in small-scale goat production.

Materials and methods

General husbandry and management

Site

This study was conducted in Mpumalanga in the Moutse district (between 25° 27'E and 30° 58'E and relative humidity of ca. 75 %). This is a typical rural area and the agricultural pressure on the land is very high. Small ruminants are enclosed and tethered in a wooden hut during the night and are only allowed to graze and browse during the day under the supervision of a young boy or girl. The seasonal characteristics of the area are summer (October – January) winter (May – July), autumn (February – April) and spring (August – September)

Survey method

The objectives and methodology of the survey was explained at a village meeting in Moutse. Forty goat farmers were randomly selected from seven villages and between 4 and 156 goats were monitored from February 1997 to November 1997. Each herd was visited on a monthly basis to record the reproductive and growth performance. At the beginning of the study all animals were weighed and aged by dentition (Webb et al, 1998). Estimates of growth performance and age at first kidding were only obtained from animals with known birth dates, while weaning was assumed to occur at 150 days (Wilson, 1983 and Devendra et al., 1980).

Data analysis

Age at first kidding, kidding interval, average litter size, annual kidding rate, kidding percentage, type of birth and mortality rate were calculated and analysed by means of multifactor analysis of variance (SAS,1991).

Results and discussion

Flock structure

Prestige and status were terms used in derogatory manner, to describe the behavior of traditional ownership in relation to their animals. The reasons for keeping livestock are rational and are related to their particular needs in the long or short term. This is supported by the age and sex structure of the flocks. In rural area, goats are generally more important than sheep for sacrifice purposes (Van Wyk, 1967). Nevertheless, goats and sheep do not arouse the same emotions in rural people as do cattle (Hunter, 1936). Whatever the major objective of keeping the goats there is always the preponderance of the female in the flock while minor differences in sex and age structure are maintained. All animals in the flock are productive, whether production consist of giving birth to young, producing milk, or simply the process of growth to a size at which another product becomes the principal one.

The major management practice used to obtain stability of structure is the selling or slaughtering of the bucks for home consumption and/ or performance of rituals, for goats not required for other production function There are usually one or two bucks retained in the flock functioning in reproduction.

The animal production system in Mootse is traditional, with_the principal degree of dependence of the household or the production unit on livestock or livestock products for household income or for food supply .The agricultural crop production are in association with the livestock production. Goats are managed on free ranging and are allowed to graze a distance away from home, sometimes under the supervision of the herdsmen and are enclosed in a wooden hut at night. Daily movement of livestock from home to the grazing fields is recognised as an important aspect of management within the system .The enclosing of livestock in the huts is done mainly to protect them from theft and predation

Ownership of goats

The case of South Africa regarding the role of women in various aspects of ownership is typical in many other African countries having similar cultural background. In most African countries culture dictates that women are subordinates to men and hence are socially marginalised (Michael, 1998). Goats are owned by women but they do not have a room for decision making on how to utilise their animals, e.g. they are not allowed to sell goats in the absence of husbands who are migrant labours, even though they are they who own them. The various decision-making levels related to goat's ownership in Mootse

depict a conspicuous gender imbalance which is a product of strong cultural background biased against women.

There is an increasing number of goats and an increasing number of people who keep goats. Goats are generally more prolific and easier to manage than sheep for people with little animal experience. Goats forage more widely and on a greater variety of foods, they are resistant to drought conditions because they browse and they have a faster breeding cycle. They are often the first class of animals available and are kept by people with a livestock tradition. Although the official statistics do not show this yet, it is probable that the number of goats kept by the rural people have increased quickly in both relative and absolute terms in the last few years Table 1. The ownership of goats bestows prestige, they have a place in local custom and religion. It is probable that goat population will continue to expand relative to sheep and cattle in the foreseeable future.

Annual reproductive rate

The annual reproductive rate is a composite parameter which does not appear to be utilised as much as it should be (Wilson, 1989). The total number of young per breeding female per year has been calculated as the size of the litter and the number of days in a year divided by the kidding interval, that is $(\text{litter size} \times 365 / \text{kidding interval})$. The annual reproductive rate for indigenous does was found to increase with age and peaks at 3 to 4 years of age, remain stable and then starts to decline. (Table 6)

Breeding season

The goat is the most prolific of all the domesticated ruminants under tropical and subtropical conditions and certain goats are able to breed throughout the year (Devendra et al, 1970, Casey et al 1988, Hofmeyer et al, 1965, and Greyling, 1988). The indigenous goats in Mootse breed throughout the year with the highest kidding in South African autumn which indicates summer breeding which coincides with optimum feed availability. The length of the breeding season is primarily the result of genetic and environmental interaction (Casey et al, 1988) with the environment playing a major role.

Tropical goats have been reported to be polyestrous all year round, Devendra et al (1983) and Amoah et al, (1990), and it is believed that environmental factors other than the photoperiod (e.g., feed availability, rainfall, temperature and humidity variations) may affect the breeding season of goat (Prasad et al, 1979)

Gestation period

The gestation period is usually defined as the period of time from conception to parturition. In this study the gestation length for indigenous goats in Mootse was found to be 145 to 148 days, this is similar to the gestation period in Boer goat doe (Greyling, 1988). The gestation period of 149 days is normal in the goat (Shelton, 1978), varying between 144 and 150.8 days. Whether the weight of the kids, type of birth (single or twins) and type of diet affect the gestation period was not evaluated in this study.

Age at first kidding

Similar to the Boer goat does (Casey et al, 1988 and Greyling, 1988), the indigenous goats in Mootse are early breeders, reaching puberty at 6 to 7 months of age .The age at which they first kid is between 16 and 18 months. Other authors (Bertaudiere, 1979, and Dumas, 1980) reported similar results (16 – 17) for age at first kidding for West African Dwarf goats in Chad. This is longer compared to Togo, Sahel and Maradi goats (15 months, 13 Months and 14 months, respectively), Wilson, et, al (1989) and for West African Dwarf goats in Nigeria (Ikwaegbu, et al, 1996). The effect of age at first kidding for the communal goats is shorter than that reported for Rwandan goats, (21 Months, Wilson, 1989). Compared to most breeds of goats in the tropics the goats in Mootse are more prolific than most of other reports on age at first kidding in African traditional systems (Wilson 1982, Manjeli et al, 1996, and Ikwuegbu, 1995. This situation is expected in traditional management systems where bucks run continuously with does

Litter size

Litter size was 1.7. The most frequent litter size was twins (96 % and 93 % for both autumn and spring) respectively together accounting for 76 % and lower twinning in winter (32 %) accounting for 24 % of births. In winter 68 % of kids were born as singles (Table 3).

Table 3: Seasonal type of birth for communal goats

Season	Single birth	Twin birth	Proportion of total
Autumn	4%	96%	54%
Winter	68%	32%	24%
Spring	7%	93%	22%
Summer	0%	0%	0%

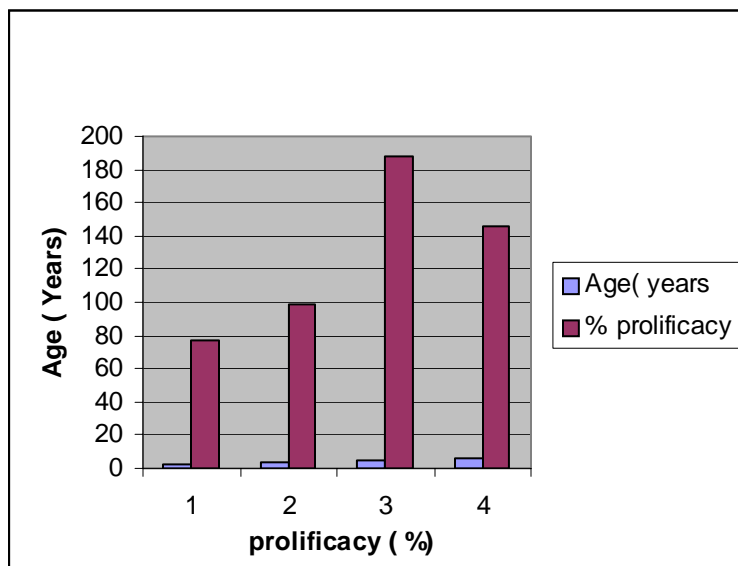
Kidding interval

The interval for indigenous goats in Mootse was 258 days. This interval is slightly shorter compared to those obtained from previous studies in West Africa for West African Dwarf goats and with other types of goats in other parts of Africa (Odubute et al, 1992 and Wilson, 1984) .The kidding interval of 250 days is similar to that found for West African

Dwarf goats in Southern Nigeria (Ikwuegbu et al, 1996). The shortest interval generally occurs in traditional systems where uncontrolled breeding is the norm. Thus in effect the goats in Mootse, under traditional village conditions kid three times in two years, in agreement with the findings of Mack (1983). The-kidding pattern indicate that the prolificacy of indigenous goats in Mootse increases with age, reaching its peak at four years of age (Table 6).

Table 6: The effect of age on prolificacy of indigenous goats

Age (years)	Prolificacy
2.5	56.1 – 77.3%
3.5	7.3-98.2 %
4.5	1.33.4- 183.7%
5.5	106.2-146.3%



Mortality rate

The mortality rate of goats in Mootse ranged between 3.75 and 40.1 %. Similar rate of mortalities were reported in other parts of Africa for goats (Bembridge, 1988, Manjeli et al, 1996, Wilson et al, 1985, Ikwuegbu et al, 1996, Gall, 1981, and Devendra et al 1970). Unlike the West African Dwarf goats where the major causes of mortality were mainly Stillbirth or abortion, the mortality rates of goats in Mootse emanates mainly from poor hygiene (coccidiosis), theft and predation. These causes of mortality could be controlled if proper management practices are instituted.

Constraints to goat production

Potential productivity of goat is constrained by poor understanding of the many values of goats and of strategies for improved natural resource management in target environments. False perceptions (environmental degradation, biases, inadequate official support and resources use are the major believes of people to rule against goat production. Until recently, in Southern Africa there has been an official bias against the goat as destroyer of vegetation. Because of this prejudice, efforts to exploit the full potential of this animal has been generally minimal compared to efforts in sheep and cattle (Bembridge, 1988).

The controversy-surrounding goat is associated with the environmental and alleges resource degradation. Such criticism are not unique and can apply to other herbivores, but with goats, the allegations are more severe because of their unique mouth parts, selection of feeds, ability to adapt to varying forage quality and capacity to use coarse grazing and shrubs to advantage.

It has only been in the seventies that animal scientists acknowledged the value of indigenous cattle and small stock breeds. Comprehensive breed characterisation studies started on the beef breeds, but, unfortunately, small stock has not been characterised to the same extent (Scholtz et al, 1998).

Studies on small ruminants, particularly goats have been less numerous than cattle and major production constraint are less well known. Nutritional problems appear to be less acute than on cattle (Wilson, 1987). Theft, predation and poor hygiene in ascending order appears to be the most important problem limiting goat production in Mootse. Lack of understanding of economic and social values of small ruminants by developers and scientists undoubtedly restrict goat production and education program to overcome this could be of great benefit to rural people.

Potential for goat production

In animal production systems, the value of species increases in relation to its adaptation, capacity to make socioeconomic contributions, capacity to fill market opportunities and potential for increasing productivity. There is a considerable potential for increased goat production, provided that proper management is employed. Much will depend on recognition of their values as small domestic animals.

Substituting goats for cows in milk production can increase the goat contribution to animal production, particularly with the small-scale subsistence farmers. Better use can be made of scarce resources in developing areas because of potential higher fertility of goats and higher feed conversion in relation to body mass for meat and milk production (Teuscher, 1982). Compared to cattle, goats produce more milk on less food and are not adversely affected by declining veld conditions (Kurtze, 1982).

Silanikove, (1999) , Devendra , (1999) , Devendra et al ,(1980),Gall , (1981) , reported the adaptability of goat to harsh agro -ecological zones under desert and tropical

environments. Together with wide adaptation to harsh environments and several unique attributes (e.g. ability to eat diet composed of tree leaves and shrubs (browse), high digestive efficiency for coarse roughage's, water metabolism, and disease resistance), they also provide for food security and survival, thus making a significant but underestimated socioeconomic contribution. Nonetheless, the criticism of goat against overgrazing and natural resource degradation, it is pertinent to note that that research in continuous and rotational grazing, stocking rate and animal ratio under rangeland conditions in South Africa concluded that stocking rate had more effect on production and that sheep had greater potential for range degradation than cattle or goat (Aucamp et al, 1981)

Goats primarily produce meat but also produce milk and their contribution to the nutrition of the rural poor is significant. They supply precious proteins of high biological value in the form of milk, and meat. There is justification for increased resource to increase the contribution of goat, commensurate with their many attributes. The prospects for increased productivity based on efficient and sustainable exploitation of goats inherent unique features, such as adaptability, ability to thrive in harsh environmental conditions, resistance to disease etc should have the objective of increasing goat population in harmony with the carrying capacity of the veld. Resource allocation by national programs and donor agencies for research and development projects concerned with this species merit additional support. Their association with the poor, poverty alleviation and food security further justifies this focus.

Conclusion

The current fertility status of communal goat does is low. Poor production results mainly from kid mortality and inbreeding. In traditional livestock management does and bucks run together for the whole period of their lives, usually one or two bucks are left in the herd and can even be left for more than five years, consequently inbreeding occurs. The genetic resource of indigenous goats is therefore, at the brink of extinction should there be no efforts to improve the management of goats at the communal level.

Research and development efforts can significantly improve production from goats can simultaneously enhance the livelihood of the poor. In the search for efficiency in the improved use of available animal genetic resources, more enlightened thinking is necessary about the role that the goat can play .It is important to draw attention to the presence of potentially important improver breeds e.g. Boer goat, without the use of improved breed the full potential of goats will not be reached

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