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PRODUCTION OF HAIR SHEEP USING ACCELERATED LAMBING AND AN EXTENSIVE MANAGEMENT SYSTEM IN THE TROPICS

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ABSTRACT: St. Croix White and Barbados Blackbelly hair sheep ewes were managed using accelerated lambing in an extensive management system. Ewes grazed guinea grass (*Panicum maximum*) in a rotational grazing system throughout the year. Single sire breeding took place during 35-d periods in February, June or October with each flock producing three lamb crops every 2 years. Lambs were weaned at 63 d of age. Overall ewe fertility was 89.8% and prolificacy was 1.77 lambs per ewe lambing. Ewes that were bred in October had higher prolificacy ($P < 0.0001$) than ewes that were bred in February or June (1.87 vs 1.64 vs 1.73 lambs per ewe lambing, respectively). Ewes bred during October produced more triplets and fewer singles ($P < 0.0001$) than ewes bred at other times of the year. Ewe productivity, expressed as the ratio of litter weaning weight to ewe body weight, increased ($P < 0.0001$) from 41.6 to 50.3% during a 10-yr period. These results show that hair sheep productivity can be sustained and enhanced using accelerated lambing and extensive management in the tropics.

Key words: Sheep, Production, Lambs, Tropics, Management

INTRODUCTION

Sheep production in the Caribbean is limited to the production of animals for meat. Since resources are limited in many areas of the tropics, the use of sheep for meat production is partly based on economics. Sheep can be raised on smaller plots of land, require less feed than cattle, produce multiple offspring and have a shorter inter-birth interval. The breeds of sheep found throughout the region consist of hair breeds. The predominant breed is the St. Croix White with smaller numbers of Barbados Blackbelly and various crosses of these two breeds. These breeds of sheep are well adapted to the tropical environment. Traits that make them well suited to the tropics include a lack of wool, the ability to breed at all times of the year, tolerance of intestinal parasites and the ability to produce and raise multiple lambs.

Many sheep producers in the Caribbean do not manage their flocks with defined breeding and lambing seasons. This is due to the fact that sheep in this region do not exhibit a true seasonal pattern of reproductive cycles due to the minimal change in photoperiod (Evans et al., 1991, Swartz and Hunte 1991). Hair sheep also have a postpartum interval to estrus of approximately 40 d (Godfrey et al., 1998). The short postpartum interval and year round breeding allows these breeds to produce multiple lamb crops in the same amount of time that temperate breeds only produce a single lamb crop.

The cost of importing concentrate feed is prohibitive for most livestock farmers in the US Virgin Islands and other islands of the Caribbean, so the vast majority of small ruminant production is based on a system that relies on forages as the major source of nutrients for the animals. The animals either graze in pastures or the forage is brought to the animals in a cut and carry system. The extensive management system of grazing animals relies heavily on the seasonal availability of native forages, which is one of the limiting factors of livestock production in the tropics. The environment on St. Croix is considered to be semi-arid with seasonal precipitation. The dry period lasts from January through April, and September through December is the wettest time of the year (Godfrey and Hansen 1996). This seasonal pattern of rainfall leads to a seasonal pattern of forage production with the forage quantity being maximal during the rainy season.

This project was conducted to evaluate long term production traits of hair sheep using accelerated lambing and an extensive management system in the tropics. To accomplish this, production records from the research flock at the University of the Virgin Islands Agricultural Experiment Station were analyzed retrospectively.

MATERIALS AND METHODS

Records from the research flock at the Sheep Research Facility on the St. Croix Campus from 1993 to 2003 were utilized. The breeds of sheep consisted of St. Croix White (STX) and Barbados Blackbelly (BB). The sheep were kept in two flocks, designated A and B. The A flock consisted of both STX (n= 25- 40) and BB (n= 20- 35) ewes. The B flock was composed of only STX ewes (n=30-35). Both flocks were maintained on guinea grass (*Panicum maximum*) pastures in a rotational grazing system. The A flock grazed a set of 8 pastures (0.8 ha each) and the B flock grazed another set of 8 pastures (0.4 ha each). Ewes were stocked in each set of pastures at a rate of approximately 10-12 ewes/ha of pasture. Pastures were managed using rotational grazing and ewes were moved every 7-21 d depending on forage availability.

All breeding was done using single sire matings (ram:ewe $\leq$ 1:20) with the ewes exposed to the rams for 35 d. During the breeding period the ewes and rams were split into breeding groups, placed in dry lots and fed a maintenance ration of a 16 % crude protein pelleted feed (PMI, Mulberry, FL) and guinea grass hay. The accelerated lambing system was based on an 8 mo cycle with each flock (A and B) bred 4 mo apart. This resulted in bleedings taking pace during February, June or October, which led to lambing in March, July or November (Figure 1). Over time, each flock produced 3 lamb crops every 2 yr in a staggered progression (i.e., the A flock bred in February and the B flock bred in June). After the breeding period, the ewes were put back in their pastures for the duration of gestation and lactation. Ewes in both flocks were weighed each week throughout the year.

Ewes gave birth on pasture and the lambs were processed within 24 hr of birth. Lamb processing consisted of weighing, tattooing and ear tagging. At 7 and 11 wk of age lambs were given a clostridium/tetanus toxoid vaccine and dewormed. Lambs were weaned at 63 ± 4 d of age. Weaning weight was collected at this time as well. Selection of replacement animals from the lamb crop was conducted around 3-4 wk after weaning. Initial selection of ewe and ram replacement lambs was based on type of birth, breed characteristics, weaning weight using a selection index and body conformation (Figure 2).

Ewe fertility was defined as the number of ewes lambing per the number of ewes exposed to rams. Ewe prolificacy was defined as the number of lambs born per the number of ewe lambing. Ewe productivity was defined as the litter weaning weight per ewe body weight at weaning. Data were analyzed using GLM procedures of SAS (1999) with year and breed as the main effects. Breed was not significant for any trait measured so data were pooled for final analysis.

RESULTS AND DISCUSSION

Ewe fertility remained constant ($P > 0.10$) during the 10-yr period (Figure 3). It ranged from 0.84 to 0.93% over time but there was no significant increase or decrease over the years. Ewe prolificacy increased ($P < 0.0001$) over time (Figure 4). This was primarily due to an increase to 23.01 during 2002. During this year there was an unusually high number of triplet lambs born which caused the high prolificacy.

Even though these sheep do not exhibit a strong seasonal pattern to their cycles, there was an effect of time of year on the number of lambs born. Ewes that were bred in October had higher prolificacy ($P < 0.02$) than ewes bred during either February or June (Figure 5). Previous work in our lab has shown that hair sheep on St. Croix do exhibit some seasonal patterns in their ovarian function (Godfrey et al., 1998). Progesterone concentrations during the postpartum period in ewes exposed to rams were higher during July (typical anestrous period in temperate regions) than in November (typical estrous period in temperate regions) indicating that hair sheep are barely responsive to the slight changes in photoperiod in the tropics. In another study it was shown that there was a small increase in ovulation rate between ewes bred during July and those bred during October (Godfrey et al., 2003). This is also evidenced in the present study where there were more lambs born to ewes bred during October than to ewes bred at other times of the year.

Ewe productivity increased ($P < 0.0001$) over the years as well (Figure 6). The ratio of litter weaning weight to ewe body weight increased form 0.4 to a high of 0.6. These values are in agreement with those reported in an earlier study (Godfrey et al., 1997). The proportion of lambs alive at weaning increased ($P < 0.0001$) over time (Figure 7). Individual lamb weaning weight increased ($P < 0.0001$) over time (Figure 8). Weaning weight increased 43 % from 8 kg to 11.5 kg during the 10-yr period. The increases in lamb survival to weaning and lamb weaning weight are probably related. The heavier lambs are an indirect indicator of enhanced lamb vigor, which would lead to a higher survival rate as well. The higher weaning weight may also be an indicator of increased milk production of the ewes or it may be a response to the selection pressure put on weaning weight during the replacement animal selection process.

CONCLUSION

Hair sheep can be successfully managed using an accelerated lambing system and extensive management under conditions found in the tropics. Because the sheep can breed all year round, they are more suitable to an accelerated lambing system that results in 3 lambs crops in a 2-yr period. By using defined breeding periods, lambs will be born during specified periods that further add to the management of the flock. By using selection pressure for growth traits of lambs such as weaning weight, advances can be made in producing larger lambs at weaning and will result in those lambs achieving market or breeding weight sooner.

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REFERENCES

Evans, R.C., W.C. Foote, and S. Wildeus. 1991. Environmental effects on parameters of reproduction in St. Croix hair sheep, pp. 321-327. *In* Proc. Hair Sheep Res. Symp., 28-29 June 1991, St. Croix, USVI. University of the Virgin Islands, Agricultural Experiment Station, St. Croix, VI.

Godfrey, R.W. and P.J. Hansen. 1996. Reproduction and milk yield of Holstein cows in the US Virgin Islands as influenced by time of year and coat color. Archivos Latinoamericanos de Producción Animal 4:31-44.

Godfrey, R.W., M.L. Gray, and J.R. Collins. 1997. Lamb growth and milk production of hair and wool sheep in a semi-arid tropical environment. Sm. Rum. Res. 24:77-83.

Godfrey, R.W., M.L. Gray, and J.R. Collins. 1998. The effect of ram exposure on uterine involution and luteal function during the postpartum period of hair sheep ewes in the tropics. J. Anim. Sci. 76:3090-3094.

Godfrey, R.W., A.J. Weis, and R.E. Dodson. 2003. Effect of flushing hair sheep ewes during the dry and wet seasons in the U.S. Virgin Islands. J. Anim. Vet. Adv. 2:184-190.

SAS Institute. 1999. The SAS System for Windows (v 8), Cary, NC: Inc.

Swartz, H.A. and M. Hunte. 1991. Out-of-season breeding, prolificacy, lambing intervals and weight gains at 60, 90, 120 days of age of Barbados Blackbelly sheep. pp. 133-141. *In* Proc. Hair Sheep Res. Symp., 28-29 June 1991, St. Croix, USVI. University of the Virgin Islands, Agricultural Experiment Station, St. Croix, VI.

Figure 1. The accelerated lambing system that was used to manage the breeding of the hair sheep flocks. Ewes were bred during February, June or October and lambed in July, November or March, respectively

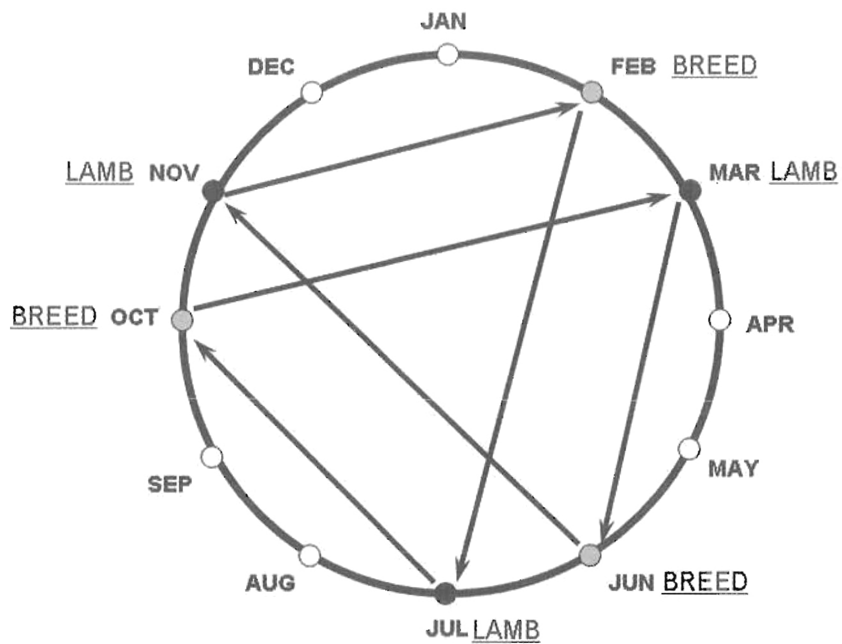
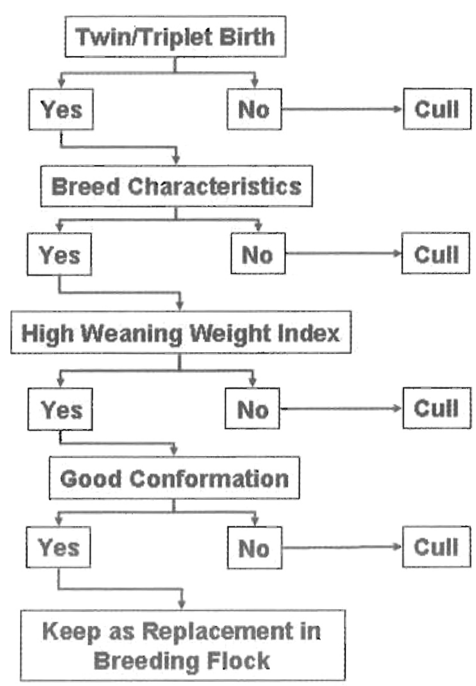


Figure 2. Selection flow chart used when selecting replacement ewe and ram lambs



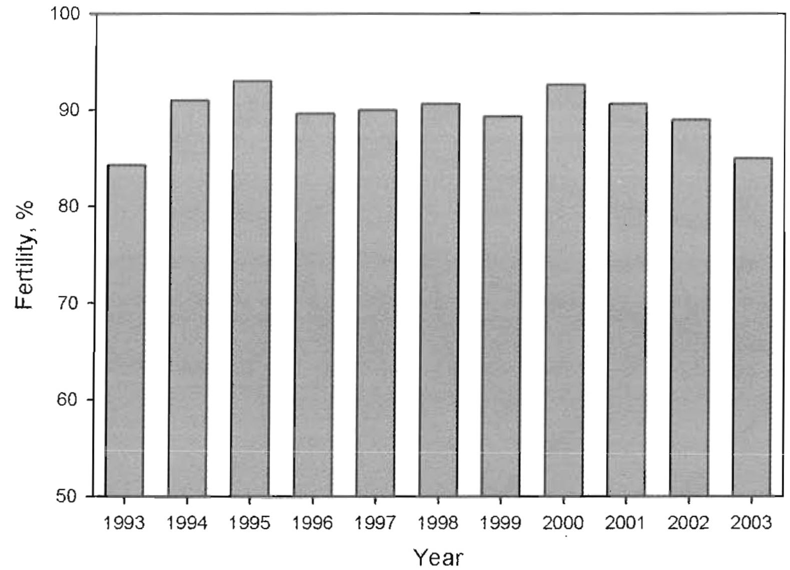


Figure 3. Ewe fertility, defined as the number of ewes lambing per the number of ewes exposed to rams, did not change over the 10-yr period (P > 0.10)

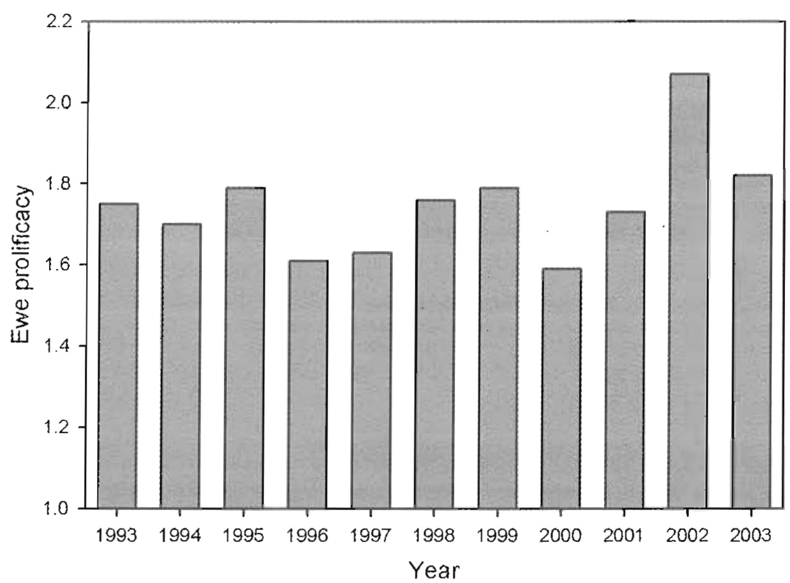


Figure 4. Ewe prolificacy, defined as the number lambs born per the number of ewes lambing, increased over the 10-yr period (P < 0.0001)

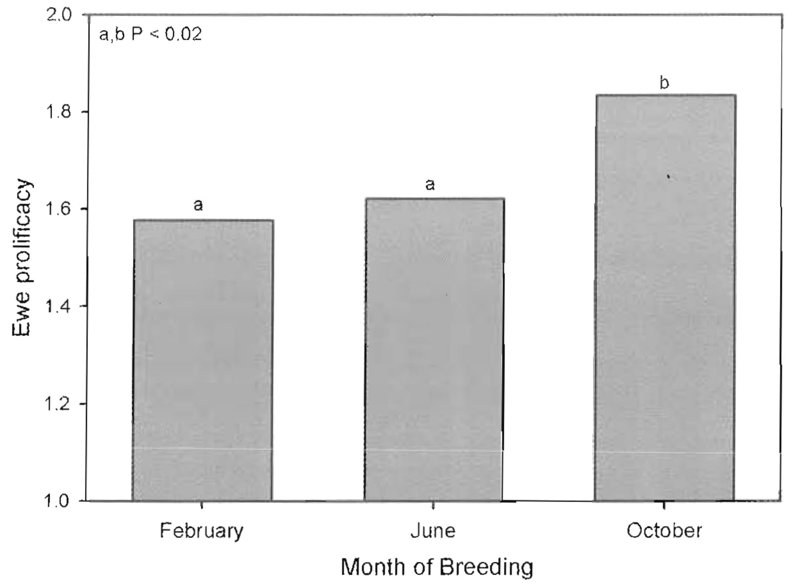


Figure 5. Ewe prolificacy during the different breeding seasons throughout the year, over the 10-yr period. Ewes that were bred in October had higher ($P < 0.02$) prolificacy

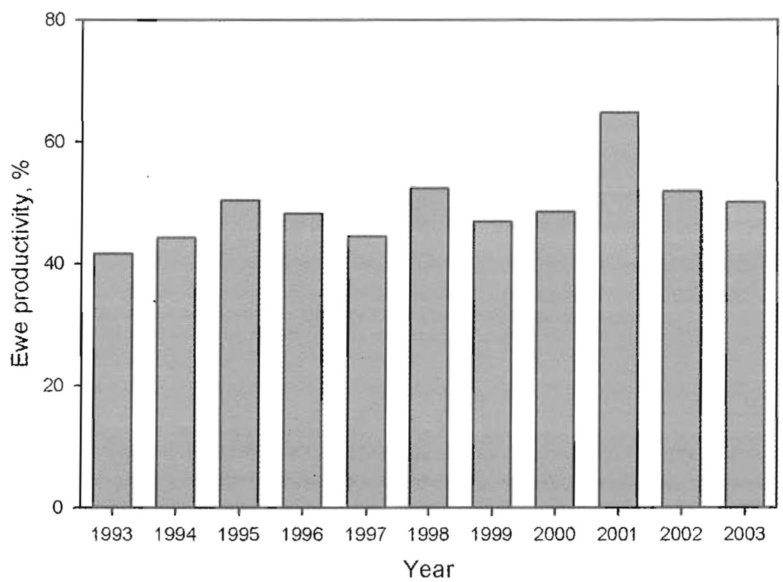


Figure 6. Ewe productivity, defined as litter weaning weight per ewe body weight at weaning, increased over the 10-yr period ($P < 0001$)

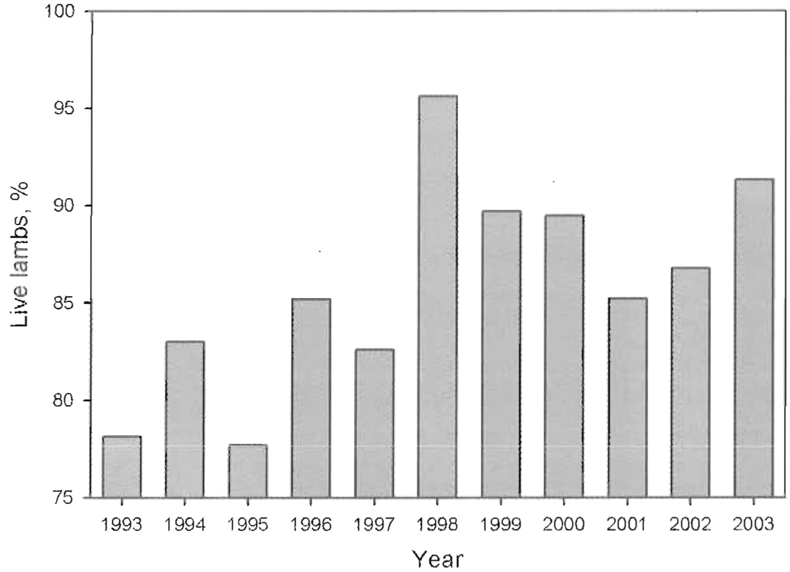


Figure 7. The proportion of lambs that survived to weaning during the 10-yr period. The survival rate of lambs increased over time ($P < 0.0001$)

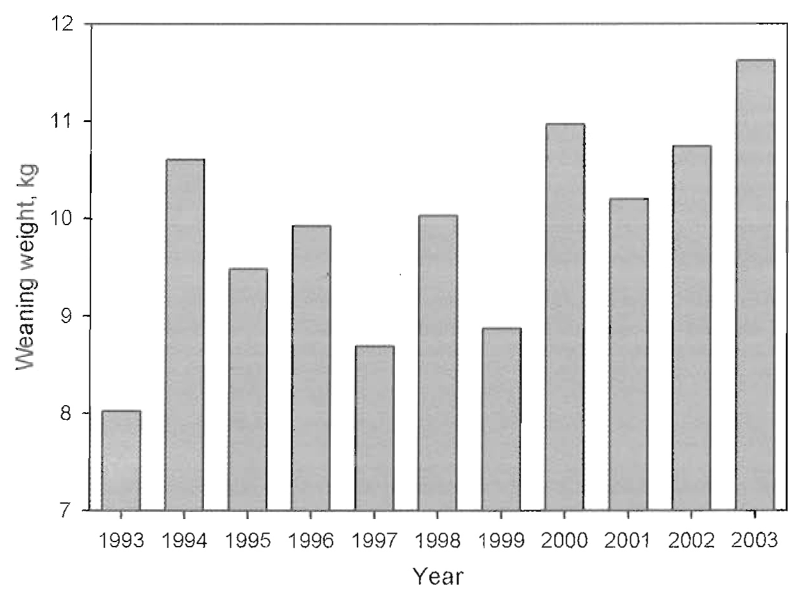


Figure 8. Lamb weaning weight during the 10-yr period. Lamb weaning weight increased over time ($P < 0.0001$)