

Estrus Synchronization and Post-Partum Management of « Mossi » Local Breed of Goat in Burkina Faso

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Summary

The « Mossi » dwarf goat is the local caprine breed most commonly reared (rare) by small holders in central and eastern Burkina Faso, in West Africa sudano-sahelian region.

Manifestations of estrus, possibility of its synchronization and post-partum anestrus were studied among this type of animals, in its natural eco-climatic environment, using various procedures of reproductive management.

Results shows that low levels of progestagens (35 mg and 40 mg of Fluoro Geston Acetate-FGA-per vaginal sponge) and short period of treatment (12 days) leads to poor response on the females (estrus settlements < 4 days post treatment, low synchronization rate after 72 h). Whereas sponges with 45 mg FGA each, applied during 18 days, produce better results for the same parameters.

Post-partum anestrus (PPA) has been significantly reduced (44 to 47 days vs 65 days for control) with « 45 mg FGA + 300 iu PMSG » and « Early weaning (1 month) + male-effect » treatments, whereas « high energy at end of pregnancy » didn't affect it.

These results emphasize some advantages of « mossi » dwarf goat, and identify majors issues for optimizing their production by appropriate and unexpensive reproductive management techniques in local conditions.

Résumé

La précocité des chaleurs, leur synchronisation ainsi que les possibilités de réduction de l'anoestrus post-partum ont été étudiées sur la chèvre naine « mossi » dans le contexte éco-climatique du plateau central du Burkina, avec différents traitements.

Les progestagènes à faible dose (35 mg et 40 mg d'Acetate de Fluoro Gestone-FGA par éponge vaginale) et les traitements de courte durée (12 jours) génèrent une moins bonne réponse des femelles, en termes de précocité d'apparition (< 4 j post-traitement) et de taux de regroupement des chaleurs à 72 heures. Cependant, les éponges dosées à 45 mg FGA, posées durant 18 jours donnaient des résultats satisfaisants pour les mêmes paramètres.

L'anoestrus post-partum (APP) a subi une réduction significative de durée (44 à 47 jours contre 65 jours pour l'APP naturel) avec un traitement « 45 mg FGA + 300 ui PMSG », de même que « sevrage précoce (1 mois) + effet bouc ». Par contre « haute énergie alimentaire en fin de gestation » n'a pas significativement affecté la durée normale de l'APP.

Ces résultats mettent en évidence les bonnes potentialités que recèle cette race et précisent les conditions d'une planification raisonnée des mises bas et d'optimisation de la reproduction à moindre coût, dans le contexte de son élevage.

Introduction

The local goat breed in the central zone of Burkina, called « mossi goat » is a genetic type related to the Djallonké dwarf goats which are widespread in larger parts of humid and subhumid regions of West Africa. But with its special phenotypic characteristics (weight, body size...), many ethnologic researchers (18) have shown that this particular breed is a stabilized product of a natural crossbreeding between « Peulhgoat » from sahelian zone and « Djallonké » from the southern region.

These animals are commonly used for local meat consumption, cultural ceremonies, and cash income, but produces low quantity of milk (not consumed by local population). On the other hand, they put out a high

adaptation to the climate and local diseases, and excellent reproductive performances.

So, because of the good meat aptitude of this breed and the high local demand among population for meat consumption, this study is initiated to determine the potential for improving its numeric productivity through an appropriate control of reproduction.

Material and methods

The study was carried out at Kamboinsé Agricultural Research Center, which is located in the natural area of the « mossi » goat. It's a sudano-sahelian region, characterized by the two main seasons: a rainy sea-

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son (June to October: 500-800 mm rainfall, 27 °C mean ambient temperature, and 87% of hygrometry) and a dry one (October to May: no rainfall at all, temperature raises 42 °C in April, and very low hygrometry 27%).

Animals

Animals concerned in this assay were local breed « mossi » goat, aged 2 to 4 years. Males were not castrated. Females were confirmed non-pregnant by showing four regular consecutive estrus signs and three normal estrous cycles during three months before beginning of experiments.

As regard nutrition, males were collectively and permanently penned, and received crops by-products (peanuts...) and supplements of bran flour and cotton-seed cakes (200 g per day/animal).

Females graze from 8 a.m. to 1 p.m., and when back in the fold, are fed of supplement made of wheat. Mineral licks were given ad lib. For healthcare, all animals were dewormed (fenbendazole PANACUR = ND : 5 mg/kg internal; and deltamethrine BUTOX-ND : 50 g/l external), and vaccinated against pasteurellosis and plague.

Experimental design

Estrus detection: three « mossi » male-goats were used as heats detectors, three times per day (6 a.m.; 12 and 6 p.m.) in females flocks. The male was harnessed to prevent from undesired copulation, and introduced in each group of females for a 10 mn session of detection, so that current signs of oestrus could be visually recognized (behaviour, vulva flow, immobilisation, male acceptance...). When a female shows heat signs, she is removed from the group, so the male can run ahead with others. After the session, the whole group is reconstituted for the next session. In cases of desired fecundations, the males were delested of their harness and then were conducted into appropriate group of females.

Synchronization of estrus: Twenty four females were divided into 3 groups: I (n=9); II (n=9) and III (n=6).

Groups I and II were treated with various levels of Fluoro Geston Acetate in vaginal sponges and different

durations of application, as shown on Table 1. No PMSG was needed here, as a consequence of our previous trials in which it's application resulted in too high superovulation rate, important embryo losses and several dystocic problems. It seems that this breed is enough prolific, and doesn't need to be supplied with PMSG.

Group III received two injections i.m. (0.25 ml each) of PGF2 ∞ (ESTRUMATE N.D. Rigaud Galena-France) at 12 days interval (Table 1).

Parameters monitored in this experiment were :

- time for onset of estrus after each treatment;
- duration of heat signs at estrus;
- rate of estrus synchronization by 48 hours and 72 hours post-treatment (P.T.).

Management of post-partum anestrus (P.P.A.)

Twenty one pluriparous females were involved in this experiment, and divided into four groups : control group C (n=7); Groupe A (n=5); Group B (n=5) and Group D (n=4). Each group received one of the following treatment:

- Group C (control) no treatment (natural P.P.A.);
- Group A: Early weaning (30 days post-delivery) + « male-effect » (separation of 2 weeks) (EW/ME);
- Group B : Feed energy at 1 1/2 of basic needs (F/E);
- Group D : FGA (45 mg in vaginal sponges for 18 days from 30th day post delivery) + PMSG (300 iu on day of sponge removal) (FGA/PMSG);

Observations in this case were focussed on PPA mean duration, according to the treatment applied, in comparison with control group where females were naturally kept until apparition of first normal cyclic estrus.

Table 1
Experimental design for « Mossi » goats estrus induction and synchronisation according to treatment given to animals

Group I (n=9) Short treatment FGA sponges (12 days)			Group II (n=9) Long treatment FGA sponges (18 days)			Group III (n=6) PGF & Treatment
s/gr 1 (n=3)	s/gr 2 (n=3)	s/gr 3 (n=3)	s/gr 1 (n=3)	s/gr 2 (n=3)	s/gr 3 (n=3)	
35 mg FGA	40 mg FGA	45 mg FGA	35 mg FGA	40 mg FGA	45 mg FGA	2 inj. (0,25 ml each) im ESTRUMATE ND at 12 days interval

Table 2
Experimental treatments for shortening post-partum anestrus duration in « Mossi » goats

Groups	Treatments
Control C (n=7)	Any treatment
A (n=5)	Early weaning (30 days) + « Male effect » (14 days female/male separation)
B (n=5)	Feed Energy (1 1/2 basic needs)
D (n=4)	FGA (45 mg/sponge) for 18 days intra vagina + 300 iu PMSG (on sponge removal day)

Analysis of results

Meantimes for onset of estrus, duration of heat-signs and post-partum anestrus are given with a confidence interval at 5% (15). Comparison of synchronization rate and PPA duration reduction according to each specific treatment are analyzed with STATITCF program.

Results

Time for onset of estrus

Animals treated for 12 days with low levels of progestagens (35 mg and 40 mg FGA per animal) didn't show any sign of estrus before the end of the two weeks post-treatment (P.T.). When using high levels of FGA (45 mg/animal), estrus occurs within 80 hours to 112 hours PT in Group I, after a meantime of 56 hours \pm 16 hours PT for Group II, and 67 hours \pm 5 hours PT for Group III. Meantimes in group II and III are quite similar, but they are significantly shorter ($\alpha=0,05$) than group I's one.

Persistence of induced heat-signs

Observations from each group I, II and III shows respectively a meantime of 32 hours \pm 3 hours, 27 hours \pm 5 hours and 27 hours \pm 3 hours as duration of heat-signs induced by the treatments applied to the animals.

Efficiency of estrus induction and synchronization

Whatever the dose administered, « short » treatment FGA doesn't practically induce any reaction during the 3 days P.T.

As a result of this, there is no estrus synchronization during that period. A few number of females got heated beyond the 4th day P.T., when using a high dose of progestagen. On the other hand, a « long » treatment FGA, as well as that one which uses prostaglandins (PGF₂) shows positive response within 48 hours P.T., whatever the dose; rate of synchronization reaches 100% within 3 days P.T. Table 3 summarizes the results obtained for this parameter.

Pregnancy and post-partum anestrus

The natural duration of pregnancy observed in « mossi » goat breed is about 146 days \pm 25 days. Treatments to reduce the duration of this sequence of reproductive cycle led to results presented on Table 4.

Table 4
Mean duration of post partum anestrus (PPA) with different treatments applied to « Mossi » goats

Treatments	Mean duration of PPA (days)
Control	66 \pm 25
Early weaning + Male effect	44 \pm 10
Feed Energy	68 \pm 29
FGA/PMSG	47 \pm 01

Early weaning/Male Effect (EW/ME) gives a PPA average duration of 44 days \pm 10 days; FGA/PMSG and Feed Energy (F/E) respectively 48 days \pm 1 day and 68 days \pm 29 days. When comparing statistically these results (at level of 0,05), FGA/PMSG and EW/ME are slightly comparable, but are, significantly shorter than treatment F/E (increasing Food Energy) and Control Group PPA.

Table 3
Estrus synchronization efficiency according to each treatment applied on « Mossi » goats. (number of animal getting heated at each delay)

		Number of animals getting heated after :			
	Animals	24 hours	48 hours	72 hours	> 72 hours
I	s/gr 1 (n=3)	0	0	0	—
	s/gr 2 (n=3)	0	0	0	—
	s/gr 3 (n=3)	0	0	0	2
II	s/gr 1 (n=3)	0	1	2	3
	s/gr 2 (n=3)	0	3	3	3
	s/gr 3 (n=3)	0	2	3	3
III	(n=6)	0	2	4	5

The mean duration of first post-partum estrus is 14 hours \pm 6 hours for Group A (EW/ME), 24 hours \pm 14 hours for Group B (F/E), 42 hours \pm 8 hours for Group D (FGA/PMSG), vs 19 hours \pm 5 hours for Group C (Control).

Discussion

When analysing the results of estrus synchronization tests, one have to distinguish notions of « expression and gathered heats », and « fertility » on experiments animals. The tendency observed in our case reveals a better efficiency of synchronization and heats expression, when using high levels of progestagens with a longtime impregnation.

Practically, all animals in this case express heats within 48 hours P.T.; low doses, as well as short time treatments, appear less efficient for both early occurrence and synchronization of the phenomenon at the flock level.

Several studies, mostly on european breeds and under temperate latitudes, have been carried out to determine the dose and durations of appropriate treatments in these specific conditions, especially out of the mating season (1, 2, 3, 4, 6, 17). Studies are scarcer about experiences on african breeds in local conditions. Our results confirm the rare earlier studies, notably Oyedidji and Coll. (14) and Hounzangbe (9). The efficacy of long treatment is probably due to the fact that 18 days application allows it to cover all ovarian physiology situations along the estrous cycle of each animal in the group. On the other hand, with the « short » treatment, animals which would be in the middle or at the end of luteal phase of cycle, shouldn't have any reaction to the progestagens; therefore, after treatment completion, these animals haven't yet blocked their estrous cycle and join those who reacted estrus positively from the beginning. So, as a result, one can observe a « dispersion » of heat expression at the level of the whole flock, and then a poor rate of estrus synchronization.

Although « fertility » of these estrus hasn't been studied in our experiment, it seems less satisfactory with induced estrus, if one refer to convergent works carried out elsewhere (2, 7, 11, 13). Nevertheless, very good results are obtained from the following heats, which are synchronized too. This situation could be explained by the depressive effect of heat induction substances on

the transportation and survival of male gametes in the female tractus. This disturbance, which is essentially biochemical and biophysical, disappears after the first induced estrus, improving the efficiency of the next one.

The duration, mesured by visible signs of estrus, shows no significant difference, whether the animals receive a synchronization treatment or not (16). It seems specially important to consider the high variability of this duration depending on the individual, due to the fact that more than 30% of the estrus observed are punctual. The average estrus duration in this study is shorter than those reported on european breeds in temperate latitudes (30 to 48 hours according to Derivaux and Ectors (1980) (8); 1 to 4 days according to Cortell (1973) (5)). On other tropical breeds, Otchieri and Nimo (1975) (12) have reported heats of 17 hours, whereas Jarosz and Coll., (1972) (10) estimated it's duration from 67.2 to 100.8 hours.

As regards the tentative experiments to shorten the ovary rest phase after delivery, it has been noted that early weaning associated to the male effect, as well as the combination progestagen/gonadotrophin have an interesting zootechnic effect. As a matter of fact, with a month and half rest period obtained with these treatments (vs more than two months naturally or with food energy flushing), one can technically manage intensification of the female service in order to optimize numeric productivity during its lifespan.

Conclusion

The « Mossi » goat, raised in the eco-climatic context of the burkinabe plateau, presents interesting natural adaptation and prolificity characteristics. Application of adapted techniques and protocols in this study allowed us to see the important reproduction potentialities of this local breed. Technical control of the sexual function, notably estrus period and post-partum ovarian dormant phase, is greatly helpfull to the producers in achieving an optimal exploitation of the flock, and thus contribute to increase meat supply for local population.

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Video

The other wealth

This video treats an interesting subject of wetland ecosystem of East Calcutta. It emphasises that the city waste water and garbage can be used for income generating projects of poorer section of the society. After necessary treatment the sewage water is used to fertilise the fish ponds. The garbage also provides sufficient nutrients for growing crops, especially the vegetables = garbage gardens. Both, fish production and crop-vegetable production, supplement the income of local people, who are often jobless. Both these activities are environmentally friendly and sustainable. They require very little input from outside.

The film emphasises the use of locally available resources and organization of cooperatives for best exploitation and commercialisation.

The film seems to be made primarily for local Bengali speaking population, as most of the conversations in Bengali are difficult to understand by others. Some subtitles in English run too fast to permit to read. The film lacks professionalism. The quality could be improved by reducing and condensing some parts and by incorporating some background music.

In spite of some imperfections, the film is useful and presents an original idea of exploiting the otherwise wasted materials. It emphasises the ecologically sound and economically profitable use of domestic wastes which are otherwise only environmental nuisance.

Technical informations:	Film:	The other wealth
	Duration:	60 min.
	Language:	English
	Format:	35 mm / Betacam / HI-band, U-matic / VHS (PAL-SECAM-NTSC)
Cost:	Print 35 mm:	30,000 US Dollar
	Betacam SP:	15,000 US Dollar
	HI-Band:	7,500 US Dollar
	VHS:	9,000 US Dollar
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