Artificial insemination of Angora goat does with pelleted deep-frozen semen

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An experiment was designed to test the effectiveness of deep-frozen Angora goat semen after insemination. Oestrous periods of Angora goat does were synchronized with the progesterone sponge technique and the does were inseminated with pelleted deep-frozen semen at oestrus. Two inseminations were carried out 12 h apart commencing 12 h after the first signs of heat were detected. Kidding percentages of the does were compared after natural mating and artificial insemination with fresh or deep-frozen semen. The results achieved were 76,7%; 90% and 34,8% respectively. Although a significantly lower kidding percentage was obtained when frozen semen was used, these results warrant further investigation of techniques for freezing goat semen.

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Die doeltreffendheid van diepbevrore Angoraboksemen na kunsmatige inseminasie is ondersoek. Die estrusperiodes van Angorabokooie is met progesteroonsponsies gesinkroniseer en die ooie is tydens estrus met verkorrelde diepbevrore semen geïnsemineer. Twee inseminasies, 12 h uitmekaar, beginnende 12 h na hittevasstelling, was uitgevoer. Lampersentasies wat na natuurlike paring en kunsmatige inseminasie met vars sowel as diepbevrore semen verkry is, was 76,7%; 90% en 34,8% onderskeidelik. Ten spyte van die laer lampersentasie wat na kunsmatige inseminasie met diepbevrore semen behaal is, regverdig hierdie resultate verdere ondersoek van bevriesingstegnieke vir boksemen.

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Introduction

Although kidding and lambing percentages are low in small stock after artificial insemination with deep-frozen semen when compared with the beef industry (Salamon, 1976), there is a growing interest in its application (van der Westhuysen, Wentzel, Viljoen & Loubser, 1980; Lightfoot & Salamon, 1970; Corteel, 1976; Colas & Brice, 1976; Salamon & Lightfoot, 1970). This experiment was therefore planned to investigate the application of artificial insemination with frozen semen in the Angora goat.

Materials and Methods

Semen was collected from Angora rams by means of electro-ejaculation. The semen was then evaluated under a light microscope and only the good quality semen was pooled and used either fresh or after deep-freezing.

Deep-frozen semen was prepared as follows: Collected semen was certrifuged for 10 min at 978 G, the supernatant seminal plasma was aspirated and the precipitant sperm cells were reconstituted to the original volume with a diluent. This washing procedure was repeated twice and the semen was finally made up to four times its original volume with the diluent. The diluent consisted of Tris (300 mm), citric acid (94,7 mm), glucose (27,76 mm), egg yolk (15%, v/v) and glycerol (4%, v/v). Semen was diluted at 30°C and then cooled to 5°C at a rate of 1°C per min. The cooled semen was frozen in 0,15 ml pellets on dry ice for three minutes. The frozen pellets were then transferred into liquid nitrogen (– 196°C) and stored. Subsequently one pellet of each batch was thawed at 38°C and examined for vitality. Only semen with a survival rate of higher than 40% was kept.

One hundred and nine Angora does were randomly allocated to three treatment groups, i.e. 30 does were naturally mated, 10 does were inseminated with fresh, undiluted semen and 69 does were inseminated with pelleted, deep-frozen semen. Artificial insemination was performed after oestrus synchronization with a twelve-day intravaginal progesterone-impregnated sponge treatment (MAP: Upjohn, S.A. (Pty) Ltd). Oestrus was detected by means of vasectomized rams and does were inseminated 12 and 24 h after oestrus detection. Intra-cervical insemination was carried out with 0,1 ml of fresh semen/doe or 0,3 ml of pelleted semen/doe. The frozen semen was thawed at 38°C prior to insemination and vitality checks were frequently carried out.

Conception detection was done, firstly, by retesting the does for a return to oestrus 17 to 22 days after insemination. The does not returning to oestrus were regarded as pregnant. Secondly, a foetal pulse examination was carried out 60 days after insemination and, thirdly, real kidding rate was determined.

Results and Discussion

The results obtained after insemination are summarized in Table 1. In the three groups, i.e. does mated naturally, does inseminated with fresh, undiluted semen and does inseminated with pelleted deep-frozen semen, the respective non-return percentages were 96,7%, 90% and 56,5%. The conception rate determined by foetal pulse detection remained unchanged in the first two groups but dropped from 56,5% to 38,1% in the group of does inseminated with pelleted deep-frozen semen.

A further drop in the estimated percentage of does kidding was recorded, as only 34,8% of the does in this group kidded. This apparent drop in conception rate may be due to morphological damage to the sperm cells during the freezing process resulting in embryonic resorption (Inskeep & Cooke, 1968).

Table 1 Conception rates, kidding percentages and fecundity of Angora does mated naturally or inseminated with either fresh or pelleted deep-frozen semen

		Artificial insemination	
	Natural mating	Fresh semen	Deep-frozen semen
Does/group	130	10	69
Does returning to oestrus	1	1	30
Non-return, %	96,7	90,0	56,5
Does pregnant	29	9	27
Conception rate, %	96,7	90,0	38,1
Does kidding	23	9	24
Does kidding/does mated, %	76,7	90,0	34,8
Kids born	36	12	32
Kidding percentage	120	120	46,4
Kids born/does kidding	1,57	1,33	1,33

A kidding percentage (kids born/does mated) of 46,4% was recorded for the does inseminated with pelleted deep-frozen semen compared with 120% for the other two groups. Fecundity (kids born/does kidding) was similar for the two groups of does inseminated (1,33) but somewhat higher (1,57), although not significant ($P>0,05$), for the group of does mated naturally.

Conclusion

Acceptable conception rates and kidding percentages were recorded for the does mated naturally and inseminated with fresh, undiluted semen while a significantly lower ($P<0,05$) conception rate was obtained when pelleted deep-frozen semen was used. The marked decline in the non-return percentage, pregnancy rate and the percentage of does kidding/does mated (Table 1) in the group inseminated with deep-frozen semen can possibly be ascribed to unstable embryonic development and embryonic resorption resulting from damage to sperm cells during the freezing process.

Although significantly lower ($P<0,05$), the kidding percentage of does inseminated with deep-frozen semen can give some indication of the success to be expected when deep-frozen semen is used for artificial insemination in the Angora goat. The initial limited success achieved in this experiment warrants further investigation.

References

COLAS, G. & BRICE, G., 1976. Seasonal variations of the fertilizing capacity of deep-frozen ram semen. *Proc. VIIIth. Int. Congr. Anim. Repr. and A.I.*, Cracow.

CORTEEL, J.M., 1976. Fertilizing capacity of washed, deep-frozen goat sperm: preliminary results. *Proc. VIIIth. Int. Congr. Anim. Repr. and A.I.*, Cracow.

INSKEEP, E.K. & COOKE, D.E., 1968. Artificial insemination and preservation of semen. *Phys of Reprod. in Sheep Symposium.* Stillwater, Oklahoma.

LIGHTFOOT, R.J. & SALAMON, S., 1970. Fertility of ram spermatozoa frozen by the pellet method. I. *J. Reprod. Fert.* 22, 385.

SALAMON, S., 1976. Fertility of ram and boar semen after longterm storage. *Proc. VIIIth. Int. Congr. Anim. Repr. and A.I.*, Cracow.

SALAMON, S. & LIGHTFOOT, R.J., 1970. Fertility of ram spermatozoa frozen by the pellet method. III. *J. Reprod. Fert.* 22, 409.

VAN DER WESTHUYSEN, J.M., WENTZEL, D., VILJOEN, K.S. & LOUBSER, P.G., 1980. Conception rates of Angora ewes inseminated with deep-frozen semen. *S. Afr. J. Anim. Sci.* 10, 237.