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Sexual behaviour of Ile-de-France rams receiving a short term flushing with lupins

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Abstract. This study investigated the effect of a short term (2 weeks) supplementary feeding on sexual behavior traits of Ile-de-France rams during late spring. Ten adult rams were fed a basal diet composed of 0.5 kg of straw, 0.8 kg of hay, 0.27 kg of barley, 0.05 kg of molasses and 0.01 kg of a mineral and vitamins supplement per day providing approximately the neat energy for maintenance according to INRA tables. During two weeks prior to joining, control rams (C) were offered the basal diet, while Supplemented (S) rams received the basal diet and were given 1 kg of lupins per ram per day. The rams were selected based on their sexual motivation and allocated to treatment groups balanced for live weight and testicular volume. Sexual activity of the rams was tested at the end of the supplementary period and following joining with a flock of Ile-de-France ewes. Rams were tested 3 times over a 2-day period. Supplementation did not affect changes in live weight or the testicular volume being 214 ± 57.2 and 215 ± 30 g for C and S rams for the latter trait. Latency to first activity, sniffing investigations, flehmen reaction and lateral approaches were not different between rams of the two groups. Nevertheless, total activity time tended to be longer for supplemented than control rams being 6.8 ± 1.09 and 6.2 ± 0.83 min respectively. Following joining, there was an overall tendency for supplementation to affect negatively sexual behavior traits. Sniffing investigations during the first 30 min of the test were 29.8 and 22 for C and S rams ($P < 0.05$). Average numbers of lateral approaches during the first 180 minutes of the test reached 19 and 11 for C and S rams ($P < 0.05$). Control rams also attempted more mounts without ejaculation than supplemented males. Preliminary conclusions point out to a possible relationship between short-term food supplementation and expression of sexual behavior of male sheep.

Keywords. Rams – Supplementation – Sexual behavior – Sniffing investigations – Flehmen.

Comportement sexuel des béliers Ile-de-France recevant une supplémentation de courte durée avec du lupin

Résumé. Cette étude a investigué l'effet d'une complémentation à court terme (2 semaines) sur les caractéristiques du comportement sexuel des béliers Ile-de-France à la fin du printemps. Dix béliers adultes ont été nourris avec un régime de base composé de 0,5 kg de paille, 0,8 kg de foin, 0,27 kg d'orge, 0,05 kg de mélasse et 0,01 kg d'un minéral et un supplément de vitamines par jour fournissant approximativement l'énergie propre pour l'entretien en fonction des tables de l'INRA. Pendant deux semaines avant de la lutte, les béliers témoins (C) ont été soumis au régime de base, tandis que les béliers complétés (S) ont reçu en plus du régime alimentaire de base, 1 kg de lupin par bélier par jour. Les béliers ont été sélectionnés en fonction de leur motivation sexuelle et divisés en deux groupes équilibrés pour le poids vif et le volume testiculaire. L'activité sexuelle des béliers a été testée à la fin de la supplémentation et au cours de la lutte dans un troupeau de femelles Ile-de-France. Les béliers ont été testés 3 fois sur une période de 2 jours. La supplémentation n'a pas entraîné de variation directe du poids ou de volume des testicules qui est de $214 \pm 57,2$ et 215 ± 30 g pour les béliers du groupe C et S. Le temps de latence à la première réaction, le nombre de flairages et de flehmen et le nombre d'approches latérales ne sont pas différents entre les béliers des deux groupes. Néanmoins, le temps d'activité totale a tendance à être plus long pour le lot complété que pour les béliers du lot témoin $6,8 \pm 1,09$ et $6,2 \pm 0,83$ min respectivement. Lors de la lutte, il y avait une tendance générale à faire que la supplémentation puisse affecter négativement les comportements sexuels. Le nombre de flairages pendant les 30 premières minutes de l'essai était de 29,8 pour le lot témoin et 22 pour le groupe C ($P < 0,05$). Le nombre moyen d'approches latérales pendant les 180 premières minutes de l'épreuve a atteint 19 et 11 pour le groupe S et le groupe C ($P < 0,05$). Les béliers du groupe S ont également tenté plus de montes sans ejaculation que les béliers supplémentés. Les premières conclusions semblent indiquer une relation possible entre une supplémentation à court terme et l'expression du comportement sexuel chez le bélier.

I – Introduction

The control of sexual behavior is a key element for the improvement and/or management of reproduction in domestic species. Several factors interact over sexual behavior of the males explaining large individual variations in sexual efficiency.

Reproductive activity of the ram is affected by several external factors that can be socio-sexual, photoperiodic and nutritional (Blache *et al.*, 2000). In general, depressive effects of nutrition on sexual activity of the rams are only observed if prolonged restriction of feed supply occurs and loss of weight ensues. Salamon (1964) has reported that sexual drive was more intense in animals fed supplements rich in proteins than supplements with low protein content. Several others workers have demonstrated that rams receiving feed supplies less than maintenance requirements display a diminution of sexual activity (Parker and Thwaites, 1972; Mattner and Braden, 1975). Overall, studies targeting interactions between nutrition and reproduction in rams have targeted testicular growth, sperm production traits and related endocrine changes. Very few studies dealt with sexual behavior and this study aims to investigate the effect of a short term supplementation with lupin grains on sexual behavior traits of rams in preparation to mating.

II – Materials and methods

The experiment was carried out at the INRA Nouzilly station (Tours, France) during Mai-June. Ten adult rams of the Ile-de-France breed were selected based on their sexual motivation and were divided into two groups (n=5) balanced for live weight, body condition score and testicular volume. Rams received every day on an individual basis a basal diet composed of 0.5 kg of wheat straw, 0.8 kg of hay, 0.27 kg of molasses and 0.01 kg of a mineral and vitamin supplement. Rams in group C received only the basal diet calculated to provide the neat energy for maintenance according to INRA tables. Rams in the supplemented group (S) and in addition to the basal diet, received each 1 kg of lupin grains equally divided into a morning and an evening meal. First day of supplementation is indicated D0 and supplementation continued for 15 days. Care was taken to introduce lupin progressively in the diet of S rams.

During the supplementation period, rams in both groups were sexually stimulated for two consecutive days. Each ram was placed in a box of 4 m² with two ewes induced in estrus. In order to assess the effect of supplementation on libido of the rams, a behavior test was undertaken at the end of the two-week period of supplementation by placing each of the rams in the box for 10 minutes. Afterwards, the rams were introduced in a flock of anoestrous females for a spring mating. A second behavior test was then carried out during the 3 hours that followed the introduction of the rams. During each of the previous two tests, the following parameters were observed and recorded: latency time to reaction in seconds, number of sniffing, number of flehmen reactions, number of lateral approaches, number of mounting attempts and total time of activity (minutes).

In addition, live weight and body condition score were measured at the start and the end of the supplementation period while testicular volume was measured weekly using an orchidometer.

III – Results and discussion

Throughout the experiment, live weight and body condition score did not markedly change in both experimental groups. Supplementation with lupin did not cause any change in live weight

and body condition score when compared to C rams. Similarly, no differences occurred in testicular volume between C and S rams (Figure 1). Testicular volume reached close values at the end of the supplementation period being 214 ± 57.2 ml and 215 ± 30 ml for respectively C and S rams.

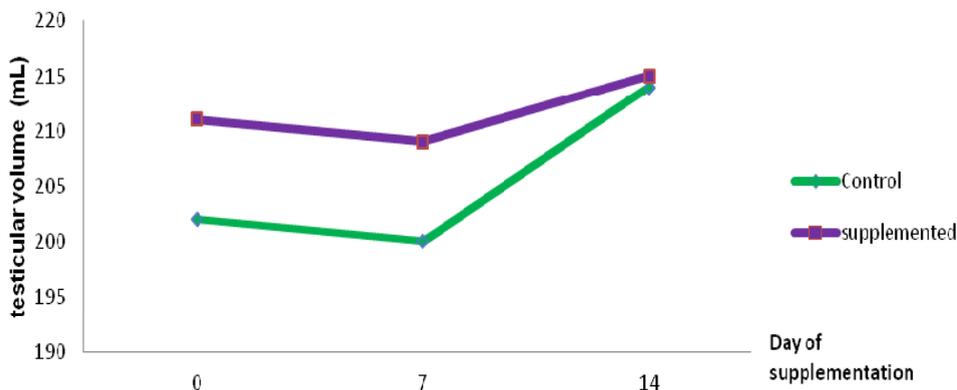


Fig. 1. Changes in testicular volume for control and lupin-supplemented rams.

These first results differ with those reported by Martin and Walkden-Brown, (1995) who recorded an increase in both live weight and volume of the testicles after 8 weeks of supplementation. This difference could be explained by the duration of the supplementation period and as concluded by Boukhliq, (1993); changes in testicular size are rarely observed before 2 weeks of supplementation but continue up to week 5. According to Oldham (1978), testicular volume is more sensitive to changes in the diet than live weight hypothesizing the existence of a preferential allocation of nutriment to the reproductive system.

Results of the behavior test at the end of the period of supplementation are depicted in Table 1. Latency time, number of sniffings and Flehmen, number of lateral approaches and the total activity time of S rams were not much different from those recorded for C rams. S rams tended to have a longer total activity when compared to C counterparts (6.8 ± 1.09 vs 6.2 ± 0.83 minutes)

Table 1. Sexual behavior traits at the end of supplementation period (2 weeks)

Parameter	Control	Supplemented
Latency (s)	1	1
Sniffing investigation	21.2	19.8
Flehmen	3.4	2.8
Lateral approach	10	12
Total activity time (min)	6.2	6.8

Following introduction of the rams in the flock of the ewes at the start of the mating season, results of the sexual behavior test are presented in Table 2. Number of sniffings during the first 30 minutes after introduction of the rams was higher ($P < 0.05$) for C in comparison to S rams. Number of lateral approaches during the first 180 minutes, averaged 19 and 11 for respectively C and S rams ($P < 0.05$). C rams also attempted more mounts than S ones. The results seem to point out that lupin addition to the diet of Ile de France rams did not improve expression of their sexual behavior. These findings corroborate what has been reported by Kara *et al.* (2010) that

nutritional supplements in the form of vitamins and minerals had no effect on the sexual behavior of the ewes. They are not consistent with results by Mahouachi *et al.* (2011) who observed an increase in the libido of rams as a result of an increase in the feeding level. Nevertheless, Martin *et al.* (2004) have suggested that sexual behavior in sheep is not much linked to nutrition pointing out that when extreme changes in weight and body reserves are induced by severe under nutrition, this may affect the motor activity of the animals and full expression of libido.

Table 2. Sexual behavior traits during mating

Parameter	Control	Supplemented
Sniffing (0-10mn)	14a	11.4a
Sniffing (10-30mn)	15.8a	10.6a
Total sniffing 1 st 30 mn	29.8a	22b
Sniffing (3h)	11.2a	11.4
Lateral approach (0-10mn)	7.4a	7.8a
Lateral approach (10-30mn)	9.2a	8.2a
Lateral approach (180mn)	19a	11b
Total mount 1 st 30mn	0.8a	0.6a
Attempted mount (120mn)	0.4a	0a
Attempted mount (180mn)	1a	0a

Means of the same line followed by two separate letters are significantly different (P <0.05).

IV – Conclusions

The study of the effect of a short term supplementation with lupin grain for two weeks in Ile de France rams prior to mating was not associated to changes in live weight or testicular volume but slightly depressed sexual behavior. Offering for short time a novel food could be the cause opening new prospects to investigate the relationship between nutrition and sexual behavior in sheep.

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