SHEEP BODY WEIGHT INFLUENCE ON REPRODUCTIVE PARAMETERS WHILE UNDER THE INCREASED DOSAGE OF GONADOTROPIC HORMONE DURING INDUCTION AND SYNCHRONIZATION OF ESTRUS IN ANESTRUS SEASON

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Abstract
Aim of this paper is to determine if there are differences in sexual reaction of mature Il d'france sheep depending on body weight of ewes that were treated with increased dosage of gonadotropic hormone by 250IU compared to usual dosage of 500IU that is given during induction and estrus synchronization during anestrus season. Total number of 99 ewes were treated, divided in to three weight groups depending on their body mass. First group were sheep whose body weight was within 40-50 kg limit, second group was between 50-60 kg and third group was sheep that had higher body weight than 60 kg (control group). All animals of all groups received intra vaginal sponges containing 30mg of fluorgestone acetate which remained within for 12 days. At the day of sponge removal each sheep received one dosage 750IU of gonadotropic hormone. Two days later "offhand" mating was done.Obtained results show that from first group 49,06%; II 50,00% and III 65,50% of treated ewes had kids. Average fertility of sheep per treatment I, II and III was 134,61% for I group, which was close to lower expected fertility limit for this breed, however fertility of second group was 157,89% and third group 160,00% was within limits of expected fertility for this breed when it is kept in optimal conditions.Conclusion was that sheep of II and III group reacted better on applied treatment and therefore achieved satisfying fertility.

Keywords: mature sheep, body weight, fluorogeston acetate, gonadotropic hormone of pregnant mares, sheep fertility.

Introduction

Sheep reproductive season starts when daylight becomes significantly shorter than night. It is usually at northern hemisphere where our country is in the period from middle of August until the first half of January (Stančić, 2008). Complex sheep neuro endocrine system is under direct influence of daylight period (photoperiod) during the year, so it manifests itself by mating season (estrus) and full resting season (anestrus) (Nenadić et.al., 1993). Outside of mating season sheep are not sexually active, they do not have estrus cycles, do not ovulate and do not express estrus signs (Mekić et.al. 2012; 2013). The effect of induction and estrus synchronization for sheep using progestogen and gonad tropic hormone of pregnant mares was researched by Mekić and Stojković (2002); Zonturlu et.al. (2011); Moradi et.al. (2012). Poly-ovulation is more often expressed with heavier and well fed sheep than with sheep that have lower body condition and body weight. In the research by (Alison, 1978) it has been determined that heavier sheep had larger number of follicle compared to sheep that had lower body weight. The effect of induction and synchronization of estrus as well as superovulation is significantly dependent on applied PMSG dosage, age and body weight of treated sheep (Moor et.al., 1985; Stančić et.al., 1995; Stančić et.al., 1991). Aim of our work is to help answering questions regarding the body weight influence of treated sheep in reproduction and dosage of PMSG during induction and synchronization of estrus in anestrus season on reproductive parameters.

Material and methods

Induction and estrus synchronization was conducted for 99 fully grown Il d'frans sheep in anestrus season at PKB "7. juli" farm, Donje Polje in Surčin, in the period from end of February until the middle of the April of the same year. Taking of body weight of sheep was conducted on livestock scale for small size rumnivorae. Depending on body weight sheep were divided in to three weight groups: I group were sheep weighing 40-50 kg; II group 50-60 kg and III group > than 60 kg. Considering that fully grown Il d'frans sheep averagely weigh 65-70 kg, third group was control group and first and second were experimental groups. Sheep were treated using Chrono-gest method, by applying intra vaginal polyurethane sponges with 30mg of Fluor-geston acetate (FGA). After 12 days sponges were removed and at that moment 750 IU of PMSG was subcutaneously injected, dose was by 250IU higher than usual 500IU dose which is used at the farm during induction and estrus synchronization. After 36-48h from intravaginal sponges removal and application of PMSG off hand mating was done. Observation and detection of sexual urge was conducted using rams in the morning between 7 and 8h, and in the afternoon from 18-19h. Sheep that were found to have the sexual urge were mated twice in the morning and in the evening (evening and morning). Results were calculated using standard variation statistic parameters and variance analysis method. Difference significance evaluation was determined using T-test.

Results and discussion

Sheep body weight mainly depends on genotype, breed that sheep belongs to, and values for body weight of treated sheep are shown in table 1.

Table 1. Average values and variability of sheep body weight in treatments (kg)

Parameters					
Treatment	No of treated sheep	$\bar{x}$	$S\bar{x}$	Sd	CV(%)
I	53	44,44	0,76	3,78	8,50
II	38	55,72	0,46	2,86	5,13
III	8	70,16	1,89	5,33	7,60

From data in table 1 we can say that sheep in third group had higher body weight than sheep from first group by 25,72 kg (36,66%) and from second group by 14,44 kg (20,58%). Moreover body weight of second group sheep compared to first group was by 11,28 kg or 20,24% higher. Above mentioned differences in body weight between groups were statistically very significant ($P < 0,01$).

Reproductive parameters

Influence of body weight of sheep on reproductive parameters is shown in table 2. Based on obtained results we can say that from first group 49.06% of treated sheep lambed, for second group 50,00% and for third group 65,50%. For second group more sheep lambed than for first group by 0,94%. However in third group more sheep lambed than in first group by 16,44% and by 15,50% more than in second group. At 100 sheep that lambed most kids were obtained in third group and that difference compared to first group was 25,39%. Total number of lambs was 73, in the first group 35, in the second group 30 and in the third group 8 (table 2.). In first group 48,57% were singles and in 51,43% were twins. For second group 30,00% were singles, 60,00% twins and 10,00% triplets. However in third group 25,00% singles and 75,00% twins were born. Therefore, in the third group percent of twins was higher by 23,57% than in first group while difference compared to second group was 15,00%. It has been determined that sheep in third group had body weight within expected values for fully grown Il d'frans sheep and that they achieved significantly better results than sheep in first and second group, whose body weights were below expected values for that breed (for sheep that finished growth). Our results were similar to ones by Allison-a (1978) where they researched influence of diet on sheep body weight, induction, ovulation and number of formed follicles. It has been determined that sheep of higher weight had higher number of follicles than

sheep that weighted less (8,89 and 5,71). Forcada and Abecia (2006), found that bad diet influences weight reserves and reduction of mating sheep body weight, which further effects at appearance of irregular cycles, lowering the ovulation rate and birth of weak offspring. In the research by Aliyara et al. (2012) number of born lambs was significantly higher for sheep that had higher body weight. Madani et al. (2001) in his research found that number of sheep that had lambs during estrus synchronization was 45-62% from total number of treated sheep which is similar to our results. However our results are lower than ones by Forcada et al. (1999) for Aragoneza breed (76,4 -82,8%) and Todini et al. (2007) for Sarda sheep 83,0%.

Table 2. Sheep reproductive parameters

N°	Parameters	Treatments		
		I	II	III
1.	% lambed compared to treated	49,06	50,00	65,50
2.	% sheep that didn't have lambs	50,94	50,00	37,50
3.	Total number of lambs	35	30	8
4.	Sheep fertility (%)	134,61	157,89	160,00
5.	Type of birth			
	-Singles (%)	48,57	30,00	25,00
	-Twins (%)	51,43	60,00	75,00
	-Triplets (%)	-	10,00	-

The fact that sheep fertility depends on sheep body weight in the moment of fertilization was determined by Gaskins et al. (2005), and Rihind et al. (1989), which was confirmed by our research too. Zarkawi et al. (1999) formed two groups Awassi sheep breed where first group (n=50) had average body weight of 55,6 kg, and control group (n=46) had average weight of 52,5 kg. Treatment was conducted (MAP - 14 days + 600 IU PMSG). Results have shown that for the first group 82% of sheep were in estrus in the time frame 36-49 hours after removal of sponges, while in second group it was 32,6% . Sheep fertility of first group was 137,5%, and for II 106,7%. Sheep in the first group had 30,00% twins while sheep in second group had 6,7%. Karaca et al. (2009) used FGA sponges for 7 days and 1 day before sponge removal injection of PGF2α and PMSG in the dose of 400 IU was applied. 88,8% sheep were in estrus. In the research by Mekića et.al. (2014) three weight groups of mating sheep were formed, first group averagely weighted 44,88 kg; II group 55,04 kg and III group 67,68 kg. All three groups were treated with 500 IU of PMSG. Sheep fertility in the groups I:II:III was 116,28:118,37:137,14%. Based on above mentioned results and data from literature we can say that induction and estrus synchronization for sheep in anestrus season can be done using (FGA 12 days + PMSG). Sheep that had body weight higher than 60kg, whose body weight was within expected limits for the specific genotype, reacted better on the treatment, had higher number of ovulated egg cells on ovaria, gave birth to higher number of twins compared to group with body weights between 40-50 kg and 50-60 kg. Sheep in first and second group had body weights that were significantly lower for II d'frans breed whose average body weight is between 60 -70 kg. When it comes to increased dosage of PMSG by 250IU than usual 500IU dose, we can conclude that it had positive effect on sheep fertility and that sheep that had higher body weight (body weight within the expected limits for the specific genotype) reacted much better to the treatment. Therefore, skinny sheep can't properly react to increased dose of PMSG, which means that mating sheep should be firstly prepared in such way that they are in adequate mating condition (having proper body weight) in order for them to positively react to applied treatment with hormones during induction and estrus synchronization in anestrus season with increased dose of PMSG.

Conclusions

Based on conducted research of mating sheep body weight influence during induction and estrus synchronization in anestrus season using FGA (30 mg/sheep, intravaginal 12 days) and PMSG (750 IU./sheep PMSG, one time) on reproductive parameters we can conclude that:

Percent of sheep that lambed compared to number of treated sheep was highest in third group 65,50%; then in second 50,00% and lastly in first group 49,06%, therefore conception percent is not satisfying.

Average sheep fertility was lowest for first group 134,61%. Fertility in second group was 157,89%, and highest fertility was in third group 160,00%.

Higher fertility in third group by 25,39% compared to first group was due to higher number of twins born, which was in third group higher by 23,57% than in first group and by 15,00% than in second group. Determined differences between lambed sheep and number of treated sheep and number of twins born in favor of third group compared to first and second were statistically significant ($P<0,05$). This research has clearly shown that sheep having higher body weight than 60kg had better reaction to treatment through higher ovulation rate than sheep that had body weight between 40 and 60kg. Sheep in third group had higher number of twins born therefore higher fertility and more lambs per sheep which has direct influence on higher production of mutton per sheep and to economy and profitability of sheep production. Research has shown that in order to achieve expected fertility for specific genotype it is needed for sheep to have satisfying body weight which is specific for fully grown mating sheep within the breed they belong to. In practice that means that skinny sheep in our research could not have positive reaction to applied treatment.

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