

# **EFFECT OF BODY CONDITION SCORE AND LIVE WEIGHT OF FERTILITY OF MERINO SHEEP AFTER INDUCTION OF OESTRUS IN THE OUT-OF-BREEDING SEASON**

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**Abstract:** Object of the study were merino sheep raised in the farm of the Agricultural institute – Stara Zagora. The experiment was conducted with a group of 68 animals of different ages, lambing after treated with hormonal preparation according to adopted scheme during the out-of-breeding season – in May. In the experimental group were included ewes which lambed earlier without making a selection in respect to their productivity.

Animals were kept under the same conditions (stall-pasture) and fed the same rations with the concentrate mixture, rough, succulent feed and grazing in quantity and composition according to their physiological status and season from the fertilization until lambing. Hormonal pattern: setting pads for sheep type Sincro-part (30mg), removing pads after 12 days and giving ewes a PMSG injection at a dose of 500 UI, applying artificial insemination at the 50-55th hour. Body condition score and live weight of the animals were determined in 4 separate periods: 1st period (after mating), 2nd period (during pregnancy), 3rd period (after lambing), 4th period (before next mating service). Improving fertility in merino sheep is significantly influenced by the preparation of ewes for the mating by reaching the respective physiological status which is expressed by score over 2.5 according to the Body condition score method and live weight over 60 kg. Animals scored 2.75-3.50 before mating have a share of 91.18% from all the sheep in the flock and have the biggest number of lambs.

**Key words:** sheep, body condition score, hormonal preparation

## **Introduction**

Determination of body condition score of sheep is widely used in the countries where sheep farming is well developed. Applied as an express assessment of the physiological status of the animals and opportunity for monitoring and

providing for their complete nutrition, this method has significant influence over the management of the flocks. In this respect, to achieve a better production efficiency it is necessary to study the existing dependence between the Body condition score and productive traits.

An important factor for improving fertility is the intensification of propagation process. Using the method for inducing oestrus in the out-of-breeding season and application of different hormonal patterns for superovulation (*Boscos et al., 2002; Jafar Yadi et al., 2011; Osama et al., 2010; Ralchev et al., 2008*) would provide more lambs per ewe.

According to *Torre et al. (1991), Attia et al. (2001) and Hatcher et al. (2007)* live weight and determination of Body condition score in the beginning of the mating have significant influence over fertility. *Sejian et al. (2009)* established that ewes with Body condition score 3-3,5 have the best reproduction rate.

Due to experiments conducted, a number of researchers report that fertility is influenced by the Body condition score (*Doney et al, 1982; Guerra et al., 1972; Koyuncu, 2005; Madani et al., 2009*).

*Davoud et al. (2012)* in their study found that Body condition score before mating has significant effect over the number of the newborn lambs and ewes scored 3 have a higher fertility. In our previous studies we established dependence between some selection traits and Body condition score in sheep from different productive range (*Ivanova et al., 2008; Dimova et al., 2008; Slavova et al., 2009, 2010*).

The object of the present study is to establish the existence of relation between the Body condition score and fertility of merino sheep after application of hormonal pattern for inducing oestrus during the out-of-breeding season.

## Materials and Methods

Object of the study were merino sheep raised on the farm of the Agricultural institute – Stara Zagora. The experiment was conducted with a group of 68 animals of different ages, lambing after treated with hormonal preparation according to adopted scheme during the out-of-breeding season – in May. In the experimental group were included ewes which lambed earlier without making a selection in respect to their productivity.

Animals were kept under the same conditions (stall-pasture) and fed the same rations with the concentrate mixture, rough, succulent feed and grazing in quantity and composition according to their physiological status and season from the fertilization until lambing.

Hormonal pattern: setting pads for sheep type Sincro-part (30mg), removing pads after 12 days and giving ewes a PMSG injection at a dose of 500 UI, applying artificial insemination at the 50-55th hour. Body condition score and live weight of

the animals were determined in 4 separate periods: 1st period (after mating), 2nd period (during pregnancy), 3rd period (after lambing), 4th period (before next mating service). In order to define the Body condition score we used the adopted 5 point system – from 1 (very thin) to 5 (fattened), (Todorov, 2008; Todorov et al., 1994; Thompson and Meyer, 1994).

Data was processed statistically by using software product STATISTICA for Windows. We use Descriptive statistical analyze with levels of significance: high  $p < 0.001$ ; average  $p < 0.01$ ; low  $p < 0.05$ . Data were presented on figures and tables.

## Results and Discussion

Type of lambing is presented in figure 1. From the total number of 68 ewes (of different ages, lambing after treated with hormonal preparation), 32 ewes (47.06 %) lambed 1 lamb, 30 ewes (44.12 %) lambed twins and 6 ewes (8.82 %) lambed triplets.

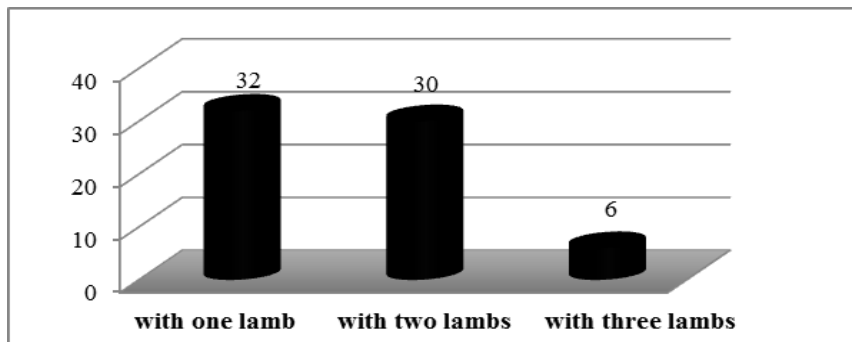


Figure 1. Distribution of sheep type of lambing, number

**Table 1. Assessment of body condition of sheep, treated with hormonal preparations**

Body condition score										
I assessment (after mating)		II assessment (during pregnancy)			III assessment (after lambing)			IV assessment (before the next mating)		
score	n	n	$\bar{X} \pm S\bar{x}$	VC	n	$\bar{X} \pm S\bar{x}$	VC	n	$\bar{X} \pm S\bar{x}$	VC
<b>With one lamb</b>										
2.50	4	4	3.125 ± 0.125	8.00	4	2.937 ± 0.062	4.25	4	2.937 ± 0.119	8.14
2.75	7	7	3.214 ± 0.085	7.00	7	2.929 ± 0.105	9.49	6	2.875 ± 0.191	16.28
3.00	7	7	3.321 ± 0.071	5.69	7	3.173 ± 0.033	3.78	5	3.200 ± 0.050	3.50
3.25	7	7	3.429 ± 0.071	5.51	7	3.214 ± 0.036	2.92	7	3.179 ± 0.046	3.84
3.50	7	7	3.536 ± 0.085	6.36	7	3.179 ± 0.118	9.81	6	3.292 ± 0.077	5.71
<b>Total</b>	<b>32</b>		<b>3.344 ±</b>	<b>7.30</b>	<b>32</b>	<b>3.101 ± 0.</b>	<b>7.61</b>	<b>28</b>	<b>3.107 ±</b>	<b>9.40</b>
<b>3,047b</b>		<b>32</b>	<b>0.043c</b>			<b>042</b>			<b>0,055b</b>	
<b>With two lambs</b>										
2.75	10	10	3.100 ± 0.076	7.77	10	3.100 ± 0.076	7.77	8	3.281 ± 0.031	2.68
3.00	13	13	3.096 ± 0.053	6.20	13	3.096 ± 0.053	6.20	13	3.212 ± 0.055	6.23
3.25	6	6	3.083 ± 0.083	6.62	6	3.083 ± 0.083	6.62	5	3.300 ± 0.093	6.33
3.50	1	1	3.000 ± 0.000	0.00	1	3.000 ± 0.000	0.00	1	3.250 ± 0.000	0.00
<b>Total</b>	<b>30</b>	<b>30</b>	<b>3.092 ± 0.037</b>	<b>6.53</b>		<b>3.092 ± 0.037</b>		<b>27</b>	<b>3.250 ±</b>	<b>5.23</b>
<b>2.983a</b>					<b>30</b>		<b>6.53</b>		<b>0.033b</b>	
<b>With three lambs</b>										
3.00	1	1	3.250 ± 0.000	0.00	1	3.000 ± 0.000	0.00	1	3.000 ± 0.000	0.00
3.25	1	1	3.500 ± 0.000	0.00						
3.50	2	2	3.625 ± 0.125	4.88	2	3.250 ± 0.000	0.00	2	3.125 ± 0.125	5.66
3.75	2	2	3.750 ± 0.000	0.00	2	3.125 ± 0.125	5.66	2	3.250 ± 0.000	0.00
<b>Total</b>	<b>6</b>	<b>6</b>	<b>3.583 ±</b>		<b>5</b>	<b>3.150 ± 0.061</b>	<b>4.35</b>	<b>5</b>	<b>3.150 ±</b>	<b>4.35</b>
<b>3.458ab</b>			<b>0.083bc</b>	<b>5.69</b>					<b>0.061</b>	

Significance: a – p<0.001; b - p<0.01; c - p<0.05

Body condition score of sheep is shown in table 1. The point system applied after mating was as follows: score from 2.75 to 3.5 was evaluated in 87,50% of the ewes which had 1 lamb; in 100% of the ewes which had twins and in 67,78 % of the ewes that had triplets, while 32.22% of the ewes with triplets were scored 3.75. The highest average score were given the ewes that lambed three lambs – 3,458 and the lowest - those that lambed twins – 2,983. Established differences were significant at p<0.001.

The biggest increase in points of Body condition score during the second period can be observed in ewes that yeaned 2 lambs – with 0,350. Differences between the groups of lambed ewes were statistically significant at p<0.01.

During the third period (after lambing) the most significant decrease in point of Body condition score is observed in ewes that have triplets - with 0,433. Differences between groups in respect to the trait which was analyzed not statistically significant at p<0.05.

The observed tendency in the Body condition score to vary according to the physiological status of the animals is unidirectional although it is different in magnitude – increasing from the first to second evaluation as the pregnancy increases, followed by decrease after lambing and after that again increasing,

connected to stabilization of physiological status and preparation of ewes for the next mating procedure.

Live weight in certain periods follows the tendency of variation of Body condition score (table 2). During the first evaluation live weight is lowest in ewes which have twins - 61,567 kg, followed by the ewes that have singles with the small difference of 0,277 and the highest in ewes that have triplets - 65,333 kg. During the second evaluation (friendly pregnancy), the increase of live weight in ewes with 1 lamb is 7.531 kg and in ewes with 2 lambs - 9.400 kg. The most significant is variation of live weight during the certain periods in the ewes with triplets - increase of 9.834 kg (from first to second evaluation) and decrease of 15.767 kg (from second to third evaluation). During the period of preparation for next mating live weight increases in all three groups. The obtained results match the physiological status of the animals but the established variances in respect to the analyzed trait are not statistically significant ( $p > 0.05$ ).

**Table 2. Live weight of sheep, treated with hormonal preparations**

BCS on I assess- ment (after mating)	Live weight											
	I assessment (after mating)			II assessment (during pregnancy)			III assessment (after lambing)			IV assessment (before the next mating)		
	n	$\bar{X} \pm S\bar{x}$	VC	n	$x \pm Sx$	VC	n	$\bar{X} \pm S\bar{x}$	VC	n	$\bar{X} \pm S\bar{x}$	VC
<b>With one lamb</b>												
2,50	4	58,250 ± 2,529	8,68	4	65,750 ± 2,529	7,69	4	61,500 ± 4,444	14,45	4	65,000 ± 1,779	5,48
2,75	7	59,000 ± 1,603	7,19	7	67,571 ± 2,653	10,39	7	59,571 ± 2,836	12,59	6	65,833 ± 4,658	17,33
3,00	7	61,000 ± 1,464	6,35	7	68,286 ± 1,426	5,53	7	60,923 ± 1,238	7,32	5	69,000 ± 4,050	13,12
3,25	7	62,286 ± 2,179	9,26	7	69,714 ± 2,504	9,50	7	59,714 ± 2,551	11,31	7	69,429 ± 2,983	11,37
3,50	7	67,143 ± 3,188	12,56	7	74,000 ± 3,024	10,81	7	66,000 ± 4,065	16,29	6	71,333 ± 3,040	10,44
<b>Total</b>	<b>32</b>	<b>61,844 ± 1,105</b>	<b>10,11</b>	<b>32</b>	<b>69,375 ± 1,162</b>	<b>9,47</b>	<b>32</b>	<b>61,562 ± 1,367</b>	<b>12,86</b>	<b>28</b>	<b>68,357 ± 1,549</b>	<b>11,99</b>
<b>With two lambs</b>												
2,75	10	59,800 ± 1,597	8,45	10	72,800 ± 2,004	8,71	10	59,300 ± 1,469	7,83	8	71,500 ± 2,383	9,43
3,00	13	62,385 ± 1,328	7,67	13	70,692 ± 1,666	8,49	13	58,769 ± 1,455	8,93	13	68,692 ± 2,073	10,88
3,25	6	62,500 ± 2,997	11,75	6	69,167 ± 2,301	8,15	6	58,500 ± 3,106	13,01	5	68,000 ± 4,990	16,41
3,50	1	63,000 ± 0,000	0,00	1	67,000 ± 0,000	0,00	1	56,000 ± 0,000	0,00	1	60,000 ± 0,000	0,00
<b>Total</b>	<b>30</b>	<b>61,567 ± 0,972</b>	<b>8,64</b>	<b>30</b>	<b>70,967 ± 1,084</b>	<b>8,37</b>	<b>30</b>	<b>58,800 ± 0,974</b>	<b>9,07</b>	<b>27</b>	<b>69,074 ± 1,521</b>	<b>11,44</b>
<b>With three lambs</b>												
3,00	1	54,000 ± 0,000	0,00	1	59,000 ± 0,000	0,00	1	54,000 ± 0,000	0,00	1	60,000 ± 0,000	0,00
3,25	1	64,000 ± 0,000	0,00	1	78,000 ± 0,000	0,00	-	-	-	-	-	-
3,50	2	63,000 ± 3,000	6,73	2	72,000 ± 1,000	1,96	2	57,500 ± 7,500	18,45	2	63,000 ± 11,000	24,69
3,75	2	74,000 ± 0,000	0,00	2	85,000 ± 0,000	0,00	2	64,000 ± 5,000	11,05	2	77,000 ± 3,000	5,51
<b>Total</b>	<b>6</b>	<b>65,333 ± 3,211</b>	<b>12,04</b>	<b>6</b>	<b>75,167 ± 4,020</b>	<b>13,10</b>	<b>5</b>	<b>59,400 ± 3,473</b>	<b>13,07</b>	<b>5</b>	<b>68,000 ± 5,177</b>	<b>17,02</b>

The yearned ewes were separated according to their Body condition score during the first evaluation (after mating) which is shown in table 3. Within ewes that had singles there was a higher share of animals scored 2.75-3.50 (87.50 %), than of those scored up to 2.50 (12.50%). Within ewes lambing twins, a higher share had the animals with score 2.75-3.00 (76.67 %), than animals with score 3.25-3.50 (23.33 %), but all of them had score from 2.75 to 3.50. Ewes having triplets were few and 83.33 % of them are scored from 3.25 to 3.50. Totally, ewes scored from 2.75 to 3.50 after mating, which is 91.18%.

**Table 3. Distribution of sheep with lambs depending on body condition score at I assessment /after mating/**

Fertility	Body condition score									
	to 2,50		2,75 – 3,00		3,25 – 3,50		over 3,50		total	
	n	%	n	%	n	%	n	%	n	%
<b>With one lamb</b>	4	12,50	14	43,75	14	43,75	0	0	32	100
<b>With two lambs</b>	0	0	23	76,67	7	23,33	0	0	30	100
<b>With three lambs</b>	0	0	1	16,67	3	50,00	2	33,33	6	100
<b>Total</b>	4	5,88	38	55,88	24	35,30	2	2,94	68	100

Animals scored 2.75-3.00 have the highest share – 55.88%, followed by those scored 3.25-3.50 – 35.30%. Results correspond to those shown by *Sejian et al.* (2009) in their study conducted with sheep.

## Conclusion

Improving fertility in merino sheep is significantly influenced by the preparation of ewes for the mating by reaching the respective physiological status which is expressed by score over 2.75, according to the Body condition score method and live weight over 60 kg. Animals scored 2.75-3.50 before or after mating have a share of 91.18% from all the sheep in the flock and have the biggest number of lambs.

## Uticaj telesne kondicije i telesne mase na plodnost merino ovaca posle vansezonske indukcije estrusa

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## Rezime

Objekat istraživanja su bile merino ovce gajene na farmi Poljoprivrednog instituta - Stara Zagora. Eksperiment je izveden sa grupom od 68 životinja različitog uzrasta, koje su se jagnjile nakon tretmana sa hormonskim preparatima u skladu sa usvojenom šemom za period van sezone - u maju. U eksperimentalnoj grupi su bile uključene ovce koja su se već jagnjile bez pravljenja odabira u odnosu na njihovu produktivnost.

Životinje su držane pod istim uslovima (zatvoreni objekat-ispasa) i hranjene istim obrokom sa mešavinom koncentrata, krmivom, sočnom hranom i ispašom u količini i sastavu u skladu sa njihovim fiziološkim statusom i sezonom od oplodnje do jagnjenja.

Hormonski obrazac: postavljanje jastučića za ovce - tip Sincro-part (30 mg), uklanjanje jastučića nakon 12 dana i davanje ovcama PMSG injekcije u dozi od 500 UI, primena veštačke oplodnje u 50.-55. satu.

Telesna kondicija i telesne mase životinja su utvrđeni u 4 odvojena perioda: 1. period (posle parenja), 2. period (tokom trudnoće) 3. period (posle jagnjenja), 4. period (pre sledećeg parenja).

Na poboljšanje plodnosti merino ovaca značajno utiče priprema ovaca za parenje, i to dostizanjem odgovarajućeg fiziološkog statusa koji se izražava rezultatom preko 2,5 prema metodi ocene telesne kondicije i telesne mase preko 60 kg. Životinje koje su osenjene sa 2,75-3,50 pre parenja imaju udeo od 91,18% od svih ovaca u stadu i imaju najveći broj jagnjadi.

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