

## EFFECT OF SOME FACTORS ON HEAD AND TAIL MEASUREMENTS OF MALYA BREED LAMBS\*

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The head shape of animals changes between species and breeds, even among members of the same breed (**Çalışlar et al.**, 1996). Head, ear and tail structures are breed character in sheep. There may be differences in terms of size, length and width in head, ear and tail structure of sheep. According to tail structure, sheep can be classified as lean and short-tailed, lean and long-tailed, fat-tailed, fatty in thighs and mixed tail structure in crossbred with each other of sheep having these tail structures. Differences of tail vertebrae skeleton in fat-tailed sheep cause occurring of different tail shapes, for example, flat caudal vertebrae, S-shaped bends, facing upwards of end of tail (**Akçapınar**, 2000). Head structure changes depending on breed and sex of sheep and female have narrower head structure than males. Profile of head may be concave, flat and convex. Also, being long or short of ears, and horn shape are breed characters for sheep (**Akçapınar and Özbeyaz**, 1999).

Although **Tibin et al.** (2011) reported that effects of sex on head length, ear length and tail length were non-significant, it was reported that head length was affected by breeding region, sex and age of sheep by some authors (**Ahmad et al.**, 2009; **Mavulea et al.**, 2013). **Mavulea et al.** (2013) reported that head length for Zulu lambs was 15.3 cm at 4 months age, 18.5 cm at 12 months age and 19 cm at 24 months age. **Ahmad et al.** (2009) reported tail length was affected by age and sex of sheep. **Tabbaa** (2003) reported tail length and tail width of mature ewes were affected by lambing age and lambing month.

**Mavulea et al.** (2013) reported that tail length was affected by age of lamb and tail length was 25 cm at 4 months age and 28.6 cm at 12 months age.

Malya lambs are crossbred of Deutsches Merinofleischschaf rams with long-thin tail and Akkaraman sheep, which is Turkey's breed of domestic with fat-tailed. Malya lambs have semi-fat tail and have different tail shapes because Malya lambs are crossbred (**Anonymous**, 2006; **Atasever**, 2006; **Düzgüneş and Pekel**, 1966). There are limited researches related to head, ear and tail measurements for lambs at different age periods (**Otoikhian et al.**, 2008; **Tibin et al.**, 2011; **Mavulea et al.**, 2013; **Younas et al.**, 2013).

Malya sheep are only breed in Malya state farm in Turkey and population size of Malya sheep is 2700 heads. This study

was carried out to determine effects of birth weight, birth type, lamb sex and maternal age on head and tail measurements of Malya lambs reared at Malya state farm in Middle Anatolia region conditions of Turkey.

### MATERIAL AND METHODS

This experimental study was done between February 2011 and February 2012 year for Malya lambs reared at Malya state farm, which have steppe climate and very suitable for sheep breeding in Middle Anatolia region of Turkey. In this study, head measurements and tail measurements of 74 head lambs in birth, 64 head lambs at weaning and 31 head lambs at 12 months age were measured. For each lamb, head and tail measurements were taken by the same researcher on same day throughout duration of experiment. Head and tail measurements were taken while lambs stand on squarely all 4 legs.

Head length, head circumference, head width, distance between ears, ear length, ear width, tail length, tail-tarsal joint distance and tail width were measured by using a standard measuring tape at birth, weaning and 12 months age. Definitions regarding head and tail measurements in this study are as follows:

Head length: distance between crista occipitalis and os incisivum.

Head circumference: circumference measure for head from right next below of root of the ear

Head width: distance at a bit upper part of between both eyes measured from the widest part of head.

Distance between ears: distance between both bottoms of ears.

Ear length: distance from bottom of ear to tip of ear.

Ear width: width between two ear edges measured from where ear is the widest

Tail length: vertical distance between base of tail and tip of tail.

Tail-tarsal joint distance: vertical distance between fatty part at tail tip and tarsal joint.

Tail width: distance of width measured at the broadest part of tail (**Çalışlar et al.**, 1996; **Bıyıkoğlu**, 2009; **Yılmaz et al.**, 2011; **Koncagül et al.**, 2012).

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Effects of birth weight, maternal age, sex of lamb and birth type on head and tail measurements were investigated. Three groups were formed for birth weight (lower than 4 kg, between 4 kg and 5 kg, and more than 5 kg). As 5 years old sheep were reformed from herd in Malya state farm, four age groups were formed for maternal age (beginning with 2 years old and ending at 5 years old and older). Lambs were weaned at 4 months age in Malya state farm. Minitab packet program was used for statistical analysis (Minitab 1998). The least square means method was used to determinate of effective factors on head and tail measurements. Tukey test was used for multiple comparisons in important subgroups.

## RESULTS AND DISCUSSION

The effects of some factors on head and tail measurements at birth of Malya breed lambs were presented in Table 1. Least squares means for head length, head circumference, head width, distance between ears, ear length, ear width, tail width, distance tail-tarsal, and tail length at birth were 12.71±0.24 cm, 25.97±0.32 cm, 8.51±0.16 cm, 10.64±0.19 cm, 8.75±0.17 cm, 5.13±0.14 cm, 6.03±0.14 cm, 11.18±0.29 cm, and 14.64±0.27 cm, respectively. The effects of some factors on head and tail measurements at weaning of Malya breed lambs were presented in Table 2. Least squares means for head length, head circumference, head width, distance between ears, ear length, ear width, tail width, distance tail-tarsal, and tail length at weaning (4 month age) were 21.59±0.22 cm, 43.12±0.45 cm, 11.36±0.14 cm, 15.97±0.27 cm, 14.05±0.24 cm, 7.39±0.09 cm, 16.08±0.41 cm, 12.83±0.44 cm and 22.34±0.47 cm, respectively. The effects of some factors on head and tail measurements at 12 months age of Malya breed lambs were presented in Table 3. Least squares means for head length, head circumference, head width, distance between ears, ear length, ear width, tail width, distance tail-tarsal, and tail length at 12 months age were 30.08±0.43 cm, 45.97±0.42 cm, 12.90±0.22 cm, 18.92±0.34 cm, 15.34±0.28 cm, 8.42±0.15 cm, and 18.31±0.76 cm, 14.32±0.71 cm, and 26.32±0.83 cm, respectively.

Effects of birth weight on head length ( $P<0.001$ ), head circumference ( $P<0.001$ ), ear length ( $P<0.01$ ), and tail length at birth ( $P<0.05$ ) were statistically significant and lambs having bigger birth weight than 5 kg have larger head and tail measurements than lambs having lighter body weight (Table 1). It can be said that head size and tail measurements at birth increased with increasing of birth weight. At birth, effects of lamb sex on head and tail measurements were non-significant (NS) and differences between male and female lambs were non-significant. However, male lambs have significantly bigger head and tail measurements than female in growth periods after birth. This condition can be caused by having bigger body structure of males than females and faster growth of males as a result of testosterone hormone. Effect of maternal age on tail length at birth was significant ( $P<0.05$ ). Lambs of 3 and 4 years old ewes have longer tail

length. Effects of birth type on head length and tail width at birth were significant ( $P<0.05$ ,  $P<0.01$ ) and single lambs have generally longer head and tail measurements than twin lambs, this may be due to having more birth weight of singles than twin lambs. It can be said that single lambs generally were born at larger head and tail measurements, although effects of birth type on some measurements at birth were non-significant (NS).

At weaning, effects of birth weight on tail length and tail width were statistically significant ( $P<0.05$ ) and statistically non-significant for other head and tail measurements (Table 2). Whereas, all head and tail measurements except for ear length at weaning increased with increasing of birth weight. This shows that positive effect of high birth weight on head and tail measurements has continued until weaning. At weaning, lambs having birth weight more than 5 kg have bigger head and tail measurements than lambs with lighter birth weight. Effects of lamb sex on all head measurements at weaning were significant ( $P<0.05$ ) and males have significantly bigger head and ear measurements than females. Although effects of lamb sex on tail measurements at weaning were non-significant (NS), males have bigger tail measurements than females. Effects of maternal age on head and tail measurements at weaning were non-significant (NS). Effects of birth type on head circumference, distance between ears, ear width and tail width at weaning were significant ( $P<0.05$ ) and single lambs have longer head and tail measurements than twin lambs except for tail-tarsal joint distance. Bigger head measurements at single lambs may be caused by having a larger body structure of single lambs than twins at weaning. Shorter tail-tarsal joint distance in singles than twins shows fattier and bigger tail of singles at weaning.

In this study, head length at 12 months age was 30.08±0.43 cm and similar to value for desert sheep in previous research (Tibin et al., 2011). Ear length changed between 8.75 cm and 15.34 cm, and ear width changed between 5.13 cm and 8.42 cm from birth to 12 months age (Table 3). These values were longer than values reported between 7.7 cm and 12 cm for ear length and 4 cm and 6.3 cm for ear width in Ouda and Hissardale lambs (Otoikhian et al., 2008; Younas et al., 2013).

Tail length between 4 months and 12 months ages changed between 22.34 cm and 26.32 cm. Tail length value in this study was similar to values of Hissardale lambs (Younas et al., 2013), longer than 18.6 cm in Ouda lambs (Otoikhian et al., 2008) and smaller than 64 cm for desert sheep (Tibin et al., 2011). Tail width at 12 months ages was 18.31±0.76 cm and longer than Hissardale lambs (Younas et al., 2013). Distance tail-tarsal at 12 months age was 14.32±0.71 cm and longer than 10 cm in Akkaraman sheep (Yilmaz et al., 2011). Being smaller of distance tail-tarsal at this study shows Malya lambs have semi-fat tail and being smaller and at above of fatty part of tail. Flat caudal vertebrae, thick of tail bottom, continuing finely end of tail, and triangular tail structure is preferable in selection of Malya lambs.

Table 1. The effect of some factors on head and tail measurements at birth of Malya breed lambs

	<i>n</i>	Head length, cm	Head circumference, cm	Head width, cm	Distance between ears, cm	Ear length, cm	Ear width, cm	Tail width, cm	Distance Tail-tarsal, cm	Tail length (cm)
Birth weight		***	***	NS	NS	**	NS	NS	NS	*
<4 kg	15	12.08±0.44b	25.38±0.58 b	8.52±0.29	10.57±0.35	8.75±0.31ab	5.05±0.25	6.00±0.25	10.95±0.53	13.90±0.48a
4-5 kg	32	12.33±0.30 b	25.23±0.40 b	8.27±0.20	10.34±0.24	8.25±0.22b	5.12±0.17	5.94±0.17	11.02±0.37	14.67±0.34ab
5>	27	13.72±0.31 a	27.30±0.42 a	8.74±0.21	11.00±0.25	9.24±0.22a	5.23±0.18	6.16±0.18	11.58±0.38	15.31±0.35a
Sex of lamb		NS	NS	NS	NS	NS	NS	NS	NS	NS
Female	37	12.87±0.28	25.97±0.37	8.54±0.19	10.40±0.22	8.79±0.20	4.98±0.16	6.00±0.16	11.38±0.34	14.52±0.31
Male	37	12.55±0.31	25.97±0.41	8.48±0.20	10.88±0.25	8.70±0.22	5.28±0.18	6.06±0.18	10.99±0.38	14.74±0.35
Maternal age		NS	NS	NS	NS	NS	NS	NS	NS	*
2	36	12.67±0.24	26.14±0.33	8.23±0.16	10.72±0.19	8.90±0.18	5.13±0.14	5.74±0.14	11.91±0.30	14.31±0.27 b
3	10	13.04±0.48	26.94±0.64	8.62±0.32	11.21±0.38	9.31±0.35	5.22±0.27	6.36±0.27	10.68±0.58	15.90±0.53 a
4	22	12.24±0.34	25.38±0.45	8.09±0.22	10.53±0.27	8.93±0.24	5.10±0.19	5.79±0.19	11.39±0.41	15.06±0.38 ab
5 and older	6	12.89±0.68	25.42±0.90	9.10±0.45	10.10±0.53	7.84±0.49	5.08±0.39	6.25±0.38	10.75±0.82	13.24±0.75 b
Birth type		*	NS	NS	NS	NS	NS	**	NS	NS
Single	30	13.11±0.36a	25.83±0.47	8.66±0.23	10.75±0.28	8.70±0.26	5.31±0.20	6.39±0.20 a	11.21±0.43	14.64±0.40
Twin	44	12.31±0.26b	26.11±0.34	8.36±0.17	10.53±0.20	8.80±0.18	4.96±0.15	5.67±0.14 b	11.16±0.31	14.62±0.28
Means	74	12.71±0.24	25.97±0.32	8.51±0.16	10.64±0.19	8.75±0.17	5.13±0.14	6.03±0.14	11.18±0.29	<b>14.64±0.27</b>

Data show mean NS: non-significant, \*:  $P<0.05$ , \*\*:  $P<0.01$ , \*\*\*:  $P<0.001$ ,

a, b: The differences between the means of groups carrying various letters in the same column are significant

Table 2. The effect of some factors on head and tail measurements at weaning (4 months age) of Malya breed lambs

	<i>n</i>	Head length, cm	Head circumference, cm	Head width, cm	Distance between ears, cm	Ear length, cm	Ear width, cm	Tail width, cm	Distance Tail-tarsal, cm	Tail length, cm
Birth weight										
<4 kg	12	21.27±0.42	42.38±0.85	11.10±0.27	15.96±0.51	14.03±0.45	7.13±0.18	15.18±0.78 b	12.39±0.84	20.98±0.89 b
4-5 kg	26	21.50±0.29	43.09±0.58	11.25±0.19	15.78±0.35	14.15±0.31	7.44±0.12	15.83±0.54 b	12.64±0.57	22.49±0.61ab
5kg >	26	22.00±0.30	43.89±0.61	11.72±0.20	16.18±0.36	13.97±0.32	7.60±0.13	17.22±0.56 a	13.46±0.60	23.54±0.64 a
Sex of lamb										
Female	30	20.88±0.28b	41.73±0.57 b	11.06±0.18b	15.14±0.34b	13.44±0.30b	7.21±0.12b	15.51±0.52	12.34±0.56	21.71±0.60
Male	34	22.30±0.28a	44.51±0.56a	11.66±0.18a	16.80±0.33a	14.66±0.30a	7.58±0.12a	16.64±0.52	13.32±0.55	22.96±0.59
Maternal age										
2	28	21.72±0.26	42.80±0.52	11.50±0.17	15.83±0.31	14.07±0.28	7.41±0.11	15.58±0.48	12.99±0.51	22.35±0.54
3	9	21.70±0.47	42.26±0.95	11.23±0.30	15.25±0.57	13.71±0.51	7.18±0.20	15.96±0.87	12.74±0.93	21.32±0.99
4	22	21.93±0.32	43.13±0.64	11.61±0.20	16.30±0.38	14.28±0.34	7.48±0.13	15.40±0.59	13.35±0.63	23.32±0.67
5 and older	5	21.00±0.62	44.29±1.26	11.09±0.40	16.51±0.75	14.14±0.67	7.50±0.26	17.37±1.16	12.24±1.24	22.35±1.32
Birth type										
Single	28	21.85±0.32	44.23±0.65a	11.44±0.21	16.81±0.39a	14.33±0.35	7.58±0.14a	17.73±0.60a	12.24±0.65	22.97±0.68
Twin	36	21.33±0.26	42.01±0.52b	11.28±0.17	15.14±0.31b	13.77±0.28	7.20±0.11b	14.42±0.48b	13.42±0.51	21.70±0.54
Means	64	21.59±0.22	43.12±0.45	11.36±0.14	15.97±0.27	14.05±0.24	7.39±0.09	16.08±0.41	12.83±0.44	22.34±0.47

Data show mean NS: non-significant, \*:  $P < 0.05$ , \*\*:  $P < 0.01$ , \*\*\*:  $P < 0.001$ ,

a, b: The differences between the means of groups carrying various letters in the same column are significant

Table 3. The effect of some factors on head and tail measurements at 12 months age of Malya breed lambs

	<i>n</i>	Head length, cm	Head circumference, cm	Head width, cm	Distance between ears, cm	Ear length, cm	Ear width, cm	Tail width, cm	Distance Tail-tarsal, cm	Tail length, cm
Birth weight										
<4 kg	6	29.59±0.82	46.73±0.80	13.13±0.42	19.40±0.66	15.16±0.53	8.19±0.28	19.66±1.46	13.81±1.37	25.94±1.60
4-5 kg	12	29.74±0.54	44.98±0.53	12.84±0.28	18.44±0.44	15.22±0.35	8.54±0.19	17.27±0.97	13.74±0.91	25.68±1.06
5>	13	30.92±0.48	46.19±0.47	12.73±0.25	18.93±0.38	15.64±0.31	8.52±0.16	18.00±0.86	15.42±0.80	27.33±0.93
Sex of lamb										
Female	26	28.84±0.37b	43.66±0.36b	12.32±0.19b	17.33±0.29b	15.10±0.24	8.34±0.13	17.51±0.66	14.44±0.61	24.97±0.71
Male	5	31.33±0.82a	48.28±0.81a	13.48±0.42a	20.51±0.66a	15.58±0.53	8.50±0.28	19.11±1.47	14.20±1.37	27.67±1.60
Maternal age										
2	11	29.77±0.67	45.93±0.66	12.92±0.35	18.77±0.54	14.75±0.44	8.44±0.23	17.95±1.20	13.71±1.12	27.92±1.31
3	7	30.63±0.67	45.97±0.66	12.62±0.35	18.66±0.54	15.31±0.44	8.46±0.23	19.82±1.20	13.74±1.12	26.77±1.30
4	8	29.51±0.80	46.25±0.79	13.03±0.41	18.82±0.64	15.40±0.52	8.21±0.27	18.97±1.43	15.00±1.34	25.75±1.56
5 and older	5	30.42±0.76	45.71±0.74	13.03±0.39	19.44±0.61	15.91±0.49	8.57±0.26	16.51±1.35	14.84±1.27	24.84±1.48
Birth type										
Single	13	30.32±0.55	46.41±0.54	13.23±0.28	19.54±0.44a	15.73±0.36	8.65±0.19	18.87±0.98	14.90±0.92	26.82±1.07
Twin	18	29.84±0.52	45.52±0.51	12.57±0.27	18.31±0.42b	14.95±0.34	8.19±0.18	17.75±0.94	13.74±0.88	25.82±1.02
Means	31	30.08±0.43	45.97±0.42	12.90±0.22	18.92±0.34	15.34±0.28	8.42±0.15	18.31±0.76	14.32±0.71	26.32±0.83

Data show mean NS: non-significant, \*:  $P<0.05$ , \*\*:  $P<0.01$ , \*\*\*:  $P<0.001$ ,

a, b: The differences between the means of groups carrying various letters in the same column are significant

All head and tail measurements increased with increasing of age of lambs until 12 months age as informed by **Otoikhian et al.**, (2008). Effects of birth weight on all head and tail measurements at 12 months age were non-significant (NS). Effects of lamb sex on head length, head circumference, head width and distance between ears at 12 months age were significant ( $P < 0.05$ ) and males have bigger head measurements than females. Although effects of lamb sex on tail and ear measurements at 12 months age were non-significant (NS), males have bigger ear and tail structure than females except for tail-tarsal joint distance. Shorter tail-tarsal joint distance in males than females shows fattier and bigger tail of males at 12 months age. Effects of maternal age on head and tail measurements at 12 months age were non-significant (NS). Effect of birth type on distance between ears at 12 months age was only statistically significant ( $P < 0.05$ ). Although effect of birth type on head and tail measurements was statistically non-significant except for distance between ears, it can be said that single lambs have still bigger head and tail measurements than twin lambs at 12 months age.

#### CONCLUSION

In conclusion, all head and tail measurements of Ma-ly lambs increased progressively with increasing of age of lambs after birth. High birth weight affected positively on head and tail measurements and growth after birth. Positive effect of high birth weight on head and tail measurements has continued until weaning. Difference between male and female is non-significant for head and tail measurements at birth. However, male lambs have bigger tail and head structure in growth periods after birth. It can be said that single lambs have a bit bigger head and tail measurements than twins at all growth periods. Because of the absence of studies about head and tail region measurements of lambs, this study may create a reference for future studies.

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SUMMARY

This study was carried out to determine effects of some factors (birth weight, birth type, sex of lamb and maternal age) on head and tail measurements of Malya lambs (11/16 Akkaraman x 5/16 Deutsches Merinofleischschaf) reared at Malya state farm in Middle Anatolia region conditions of Turkey. The data were measured between birth and 12 months age for lambs. Least squares means for head length, head circumference, head width, distance between ears, ear length, ear width, tail width, distance tail-tarsal, and tail length at birth were 12.71±0.24 cm, 25.97± 0.32 cm, 8.51±0.16 cm, 10.64±0.19 cm, 8.75±0.17 cm, 5.13±0.14 cm, 6.03±0.14 cm, 11.18±0.29 cm, 14.64±0.27 cm, respectively. Effects of birth weight on head length ( $P<0.001$ ), head circumference ( $P<0.001$ ), ear length ( $P<0.01$ ), and tail length at birth ( $P<0.05$ ) were statistically significant.

Least squares means for head length, head circumference, head width, distance between ears, ear length, ear width, tail width, distance tail-tarsal, and tail length at 12 months age were 30.08±0.43 cm, 45.97±0.42 cm, 12.90±0.22 cm, 18.92±0.34 cm, 15.34±0.28 cm, 8.42±0.15 cm, 18.31±0.76 cm, 14.32±0.71 cm, 26.32±0.83 cm, respectively.

Positive effect of high birth weight on head and tail measurements has continued until weaning. Although differences between male and female in terms of head structure at birth were statistically non-significant, male lambs have bigger, wider and longer head structure in all growth periods after birth. Effect of maternal age on head and tail measurements was non-significant in all growth periods except for tail length at birth. Although statistically generally non-significant, it can be said that single lambs have bigger head and tail measurements than twins at all growth periods.

**Key words:** *Lamb, Malya, semi-fat tail, head, tail, ear, measurements.*

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