

Effect of castration and docking of lambs on maintenance behaviour and cortisol level

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Thirty apparently healthy lambs with average weight and age of 5.8 ± 0.5 kg and 15 ± 1.6 days respectively were chosen in Sids Agricultural Research Station belonging to Animal Production Research Institute in Beni-Suef governorate to investigate the effect of castration and docking on maintenance behaviour and blood cortisol level during and after such operations. Lambs were classified into castration (n=10), docking (n=10) and control (n=10) groups. The results revealed that castration and docking could significantly affect the behaviours of standing idle, recumbency, sleep, suckling and ingestion in lambs. Moreover, blood cortisol level was significantly ($p < 0.05$) increased after operation in castrated and docked lambs as compared to the time before, at operation and 3 hours after operation.

Sheep raising is important for farmers and breeders in many economical aspects, given that sheep can give milk and its products, meat, wool and hide.

In extensive sheep farming systems, male lambs may reach puberty before slaughter. Consequently, castration of males in the first few days or weeks after birth is often a standard management procedure to prevent disruption in the flock through sexual activity of young males (mounting activity, flehmen and nosing (Appleby, 1986), unwanted pregnancies and indiscriminate breeding (Baird and Wolfe, 1998; Archer, 2004). Castration has been also practiced by man for many centuries as a mean of reducing aggression (head pushing, butting and threat) and ease management (Mowlem, 1988). In addition, wethers have more weight in the desirable cuts of the hind quarters as contrasted to the ram (Haddad *et al.*, 2006).

The main reason of docking is to ensure health and sanitary conditions of the skin. A lamb with a tail is more likely to have manure built up between his body and tail, not only creating an extremely wet, dirty breeding ground for disease, but also a long tail hampers the ram's breeding efforts and makes it more difficult to assist a ewe at lambing (Outhouse, 1987).

Docking and castration are considered as severe stressors that lambs may encounter as a part of routine husbandry (Turner *et al.*, 2006) which indicated by behavioural and physiological changes indicating a considerable

pain at all ages (Wood *et al.*, 1991; Cottrell and Molony, 1995; Pawelek and Croney, 2003) as well as the level of blood cortisol was increased following such operations as shown by (Shutt *et al.*, 1988; Wood *et al.*, 1991; Kent *et al.*, 1993; Rhodes III *et al.*, 1994; Lester *et al.*, 1996; Dinniss *et al.*, 1997; Diniss *et al.*, 1999; Marai and Bahgat, 2003).

Bloodless castration method produces considerable acute pain and most of that pain occurs during and immediately after crushing the skin and spermatic cord which will be reflected on the behavioural changes that occur (Thornton and Waterman-Pearson, 1999). Furthermore, some behavioural changes could be observed in lambs which are castrated and docked by the use of clamp (Mellor and Stafford, 2000; Mellemaa *et al.*, 2006; Susanne *et al.*, 2007).

The main object of this study is to investigate the effect of castration and docking of lambs on their maintenance behaviour and changes that occur in blood cortisol level during and after such operations.

Materials and methods

This study was carried out in Sids Agricultural Research Station belonging to Animal Production Research Institute in Beni-Suef governorate.

Animals and management. The flock consists of 175 Ossimi and 145 Saidi sheep which are housed in open fronted pens with a stocking density of 1.5 to 2 m²/head. Sheep were fed on a processed feed in addition to hay and straw and

watered twice daily in the morning and late afternoon. Pregnant ewes were separated into lambing pens before expected lambing by one week. A total number of thirty apparently healthy lambs with average weight and age of 5.8 ± 0.5 kg 15 ± 1.6 days respectively were chosen for castration and docking and classified into castration (n=10), docking (n=10) and control (n=10) groups.

Castration and docking. Ten male lambs were non surgically castrated in this experiment by using bloodless castrating clamp (Burrizzo) which crush and cause irreversible damage to the vessels supplying the testes (Thronton and Waterman-Pearson, 1999). On the other hand, ten female lambs were docked by surgical amputation of the tail using sharp scalpel after crushing the dock for 2 minutes by using of Burrizzo to reduce the incidence of hemorrhage as described by (Susan, 2007).

Behaviour recording and measurements. Behavioural patterns were recorded by direct personal observation directly after application of castration and docking for 180 minutes with an interval of 2 minutes as a frequency as described by (Molony *et al.*, 1997; Molony and Kent, 1997). The patterns were recorded for comfort behaviour (standing idle, recumbency and sleep), body care behaviour (grooming), eliminative behaviour (defecation and urination) and feeding behaviour (suckling, trial suckling, ingestion and drinking water).

Blood samples and assay. About 5ml of blood was obtained from the jugular vein of each lamb in a clean dry centrifuge tube before, at the time of, 1hr and 3hrs after castration and docking as mentioned by (Molony and Kent, 1997; Kent *et al.*, 1993). Samples were left standing for about 15 minutes till complete clotting and put in the refrigerator for 4 hours to aid in clot separation, then centrifuged at 3000 r.p.m. for 15 minutes for serum separation. After that serum is pipetted and put into labeled eppendorf tubes and kept by deep freezing at -20°C till assayed. Serum samples were analyzed for cortisol hormone by the use of Competitive Colorimetric Immunoenzymatic method described by (Rolleri *et al.*, 1976).

Statistical analysis. Results were statistically analyzed by the use of one way ANOVA according to (Snedecor and Cochran, 1989).

Results and Discussion

Table (1) showed the effect of castration and docking on comfort and body care behaviour of lambs and revealed that behaviour of standing

idle was significantly ($p < 0.05$) higher in castrated (13.0) and docked (11.4) lambs than control ones (4.4). This may occur as a way to minimize stimulation of sensitized nociceptors, as found in damaged or inflamed tissues. Such result is parallel to that reported by (Shutt *et al.*, 1988; Mellor and Murray, 1989; Molony *et al.*, 1995; Lester *et al.*, 1996) but do not support that obtained by (McGlone *et al.*, 1993) who observed that standing time was increased in intact animals than those castrated. Additionally, there is a significantly ($p < 0.05$) higher frequency of recumbency in castrated (17.0) than docked (8.7) and control (9.0) lambs. This may occur as a comfortable position to relief pain. This result is similar to that obtained by (Saleem *et al.*, 2003). Furthermore, there was a significant ($p < 0.05$) decrease in frequency of sleep in docked (2.9) than castrated (7.5) and control (8.4) lambs. This may result from the pain produced by castration and docking procedures.

Opp (1995) indicated that sleep is a fundamental CNS process that is regulated by a complex interaction between neural and humoral systems and altered in response to a variety of stressors. With reference to body care behaviour, the results clarified that there was no significant difference between castrated, docked and control groups in frequency of the grooming, defecation and urination behaviours.

Concerning the effect of castration and docking on feeding behaviour as shown in Table (2), there was a significant ($P < 0.05$) decrease in frequency of suckling behaviour in docked (1.0) and castrated (2.4) than control (4.8) lambs. This may be related to the distress caused by pain reflected from the procedure. This result is in accordance with that of (Saleem *et al.*, 2003), while there was no significant difference in trial suckling frequency between the studied groups. On the other hand, there was a significant ($p < 0.05$) increase in frequency of feeding behaviour in control group (3.4) than in those castrated or docked which was not observed. Such results may be also due to the stressful and painful effect encountered in lambs subjected to the procedure. The noxious stimulus results in a decrease in animal's general physical activity or causes some activities that occur infrequently to disappear (Mellor *et al.*, 2000). Moreover, there was no significant difference in drinking behaviour between the studied groups.

The level of blood cortisol as affected by castration and docking was illustrated in Table

Table (1): Effect of castration and docking on comfort, body care and eliminative behaviours in lambs.

Behavioural patterns		Groups		
		Castrated	Docked	Control
Comfort behaviour	Standing idle	13.0 ± 2.5 ^a	11.4 ± 1.9 ^b	4.4 ± 0.6 ^c
	Recumbency	17.0 ± 1.6 ^a	8.7 ± 0.9 ^b	9.0 ± 0.9 ^b
Body care behaviour	Sleep	7.5 ± 1.2 ^a	2.9 ± 0.5 ^b	8.4 ± 1.9 ^a
	Grooming behaviour	1.0 ± 0.3	1.5 ± 0.3	0.2 ± 0.2
Eliminative behaviour	Defecation	0.1 ± 0.1	0 ± 0.0	0.0 ± 0.0
	Urination	0.2 ± 0.2	0.2 ± 0.1	0.4 ± 0.3

Results are expressed as means ± standard error (S.E. Behavioural patterns were recorded as a frequency.

^{a,b,c} superscript within rows indicates significant difference at $p < 0.05$.

Table (2): Effect of castration and docking on feeding behaviour in lambs.

Behavioural patterns	Groups		
	Castrated	Docked	Control
Suckling	2.4 ± 0.6 ^b	1.0 ± 0.3 ^c	4.8 ± 0.8 ^a
Trial suckling	1.6 ± 0.6	1.2 ± 0.6	1.1 ± 0.3
Ingestion	0.0 ± 0.0 ^b	0.0 ± 0.0 ^b	3.4 ± 0.8 ^a
Drinking	0.5 ± 0.3	0.2 ± 0.1	0.1 ± 0.1

Results are expressed as means ± standard error (S.E.)

Behavioural patterns were recorded as a frequency.

^{a,b,c} superscript within rows indicates significant difference at $p < 0.05$

Table (3): Average levels of blood cortisol (ng/ml) in castrated and docked lambs at different intervals

Time interval	Groups	
	Castrated	Docked
Before operation (-20min) as a control	39.5 ± 10.5 ^c	43.3 ± 10.7 ^c
At time of operation	73.4 ± 29.2 ^b	57.6 ± 18.4 ^c
One hour after operation	111.3 ± 30.8 ^a	117.1 ± 39.5 ^a
3hour after operation	53.1 ± 22.9 ^c	87.1 ± 43.3 ^b

Results are expressed as means ± standard error

^{a,b,c} superscript within columns indicates significant difference at $p < 0.05$

(3). The level of blood cortisol was significantly ($p < 0.05$) increased at the time of operation (0 min.) and 1h after operation in castrated (73.4 and 111.3 ng/ml) and docked (57.6 and 117.1 ng/ml) lambs than before operation (-20 min.) (39.5 and 43.3 ng/ml) respectively. At three hours after operation the blood cortisol level was significantly decreased in castrated (53.1 ng/ml) and docked 87.1 ng/ml) lambs as compared to the time of operation but still higher than

pretreatment levels. So significantly higher levels of blood cortisol were attained at the time of operation. This result could be explained as the physical injury stimulates the HPA axis leading to acute cortisol responses which after reaching the peak value it falls again by negative feed back mechanism as reported by (Aruthur and Guyton, 1991)

From this study it could be recommended that ram lambs are better not to be castrated if

they are marketed at a young age (less than 6 months). Furthermore, the decision to castrate ram lambs should be based on the management needs of the shepherd and the demands of the market place. Also castration and docking should be performed at early age of life to decrease stress on the lamb and bleeding incidence.

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تأثير الخصى وقطع الذيل فى الحملان فى سلوك الحفاظ على الحياة ومستوى هرمون الكورتيزول

تمت الدراسة على ثلاثين حمل بمتوسط وزن وعمر 0.5 ± 0.8 كجم و 15 ± 1.6 على التوالي فى محطة سدس للبحوث الزراعية التابعة لمعهد بحوث الإنتاج الحيوانى فى محافظة بنى سويف لاستبيان تأثير الخصى غير الجراحى وعملية قطع الذيل على بعض السلوكيات الحافظة ومستوى هرمون الكورتيزول أثناء وبعد هذه العمليات. تم تقسيم الحملان إلى ثلاثة مجموعات وهى مجموعة الخصى (عدد 10) و مجموعة قطع الذيل (عدد 10) ومجموعة ضابطة (عدد 10). أوضحت النتائج أن عمليتى الخصى غير جراحى وقطع الذيل كان لهما تأثيرا معنويا على بعض سلوكيات الراحة مثل الوقوف الساكن، الرقود، النوم وبعض سلوكيات تناول الغذاء مثل الرضاعة والأكل فى الحملان. بالإضافة إلى ذلك كان هناك زيادة معنوية فى مستوى هرمون الكورتيزول فى الحملان بعد عمليتى الخصى غير الجراحى وقطع الذيل مقارنة بالأوقات قبل وأثناء وبعد ثلاث ساعات من إجراء العمليتين.