

RESULTS OF STUDY ON CHANGES IN THE BODY OF LIVESTOCK CASTRATED BY UNOPENED METHOD

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ABSTRACT

“Tartu-SHAB” emasculator for unopened castration of male calf, lamb and kids is used to break ductus deferens and blood vessels and damage cremaster muscle after detecting outside the spermatic cord via palpation of scrotal neck skin.

Movement of castrated animal becomes slower, hind legs are slightly spread, animal steps on frontal wall of its hind leg hooves and lifts one of hind legs in turn, and superficial, small, painful, differently sized, and warmer swelling appears.

Cremaster fascia of testicle tissue castrated animals (at day 30) divides testicle parenchyma into lobules and there are epithelial cells producing spermatozoa at various stages of development in the wall of seminiferous tubules, Sertoli cells and Leydig cells in reticular and soft connective tissues between seminiferous tubules. But at day 60, thickened outer layer of testicle, larger gaps between tubules, structural change of primary and secondary spermatozoa, ceased cellular division and absence of Leydig cells reveal the process of atrophy.

KEY WORDS: lamb, kid, calf, testicle, spermatic cord

INTRODUCTION

It is seen that castration of male animals at younger age results in some loss of meat production potential. Postponing of castration time for late born, smaller body male young animals, and use of testicle and epididymus for biological stimulation in animal body are important for maintaining metabolism levels and promoting growth.

Traditional knowledge of herders and scientific methods for animal castration are so broad. Under current situation, scientifically proved methods such as orchidectomy, ligature and cutting spermatic cord in scrotal neck, and removal of

epididymus are mostly used in practice of animal husbandry. For above methods, surgery by incompetent person in improper restraining of animals and insufficiency of disinfection conditions leads to a number of consequences, including extreme bleeding and spilling out of intestines and omentum, followed by deaths.

The present study aimed to investigate effects of mechanical method of treating spermatic cord by breaking blood vessels, nerves and ductus deferens in male animals to be castrated on their body in association with animal species and body conformation features.

MATERIALS AND METHODS

The study was undertaken in the department of Surgery and reproduction of SVSB, laboratory of pathology of IVM, Erdene soum of Tuv aimag and Buregkhangai soum of Bulgan aimag.

A total of 26 animals were involved in the study and they were divided into both experimental and control groups, and experimental group animals were castrated by unopened method (Selected Tartu method), while control group animals by open method (Mongolian method). For the experimental group, a total of 13 animals including 4-5 months old age 5 lambs weighing 20.9 kg in average, 5 kids weighing 14.1 kg in average and 18-20 months old 3 male calves weighing 79.3 kg in average were used, whereas a total of 13 animals including 5 months old age 5 lambs weighing 20.0 kg in average, 5 kids weighing 13.9 kg in average and 18-20 months old 3 male

calves weighing 79.2 kg in average for control group.

The study was performed in two stages.

The first stage. Normal physiological parameters of examining animals before and after the castration were measured and clinical parameters were also determined by conventional methods and photography.

Lambs and kids for the study weighed before feeding their ears were tagged.

Statistical analysis for probability (P) was made by using Student's table and error m of average value M was calculated by formula modified J.Purevjav (2004).

The second stage. At days 30 and 60, testicles as histological samples were taken by surgical method and their atrophic processes were studied.

RESULTS OF THE STUDY

3.1. Development of unopened technology for castration of male lambs, kids and calves

Experimental group lambs and kids were restrained by assistant holding the animal hind legs and clamping the neck between the assistants legs, and calves were restrained by Mongolian method. Operator presses both testicles into bottom of scrotum with left hand and then palpates and find right spermatic cord, and fixes it pressing into scrotal neck skin.

Then operator opens emasculator held by right hand to insert whole neck part, and clamps the cord outside on the skin. It makes cremaster muscle damaged, and blood vessels, nerves and ductus deferens broken. Then left side cord was treated as above.

During castration of male calves by this method to prevent the cords slide laterally they were clamped after tight pressure to one side of both frame of lower clamping part of emasculator and repeated clamping was made at 1-1.5 cm distance below the first clamping site.

To check damages of cord in lambs and kids castrated by unopened method opening of scrotum by incision at hour 1 after castration reveals damaged site surrounded with clear edges due to pressure of emasculator, swollen tissues, broken blood vessels, red brown hematoma, damaged cremaster muscle and broken blood vessels and ductus deferens.



Photo 1. Fixation of spermatic cord of kid and breaking it with emasculator

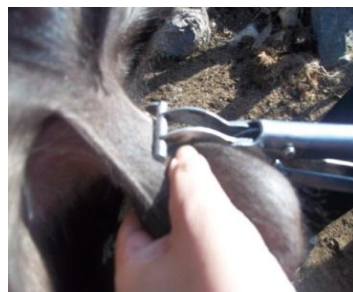


Photo 2. Pathologic changes occurred on spermatic cord
a, c – cut part of testicles and spermatic cords of lambs castrated by unopened method; *b* - cut part of testicles and spermatic cords of lambs castrated by open method



3.2. Study of some clinical parameters of castrated animals

Measurement of clinical parameters of lambs castrated by unopened method before castration of experimental group animals in only replicate demonstrated that body temperature, respiration and heart rates of lambs are 38.0°C, 25.4 and 70.0 respectively, while they are 39.0, 24.0 and 75.0 in kids respectively and 38.3, 16.6 and 62.6 in calves respectively. For control groups they are 38.2, 26.6 and 70.2 in lambs respectively, and 38.8, 24.8 and 74.8 in kids respectively, while they are 38.7, 16.3 and 61.3 respectively.

At hour 6 after castration, respiration rate, heart rate and body temperature of experimental group lambs ranges from 25 to 31, 68 to 73 and 38.0 to 39.3 respectively, whereas these parameters in control group lambs changed from 28 to 35, 71 to 78 and 39.0 to 39.9 respectively. But at hour 24, respiration rate, heart rate and body temperature of experimental group lambs ranged between 23 and 30, 70 and 74, and 38.0 and 38.6 respectively, while they are between 26 and 30, 70 and 77, and 38.2 and 39.3 respectively.

Table 1

Results of comparison of clinical parameters of experimental and control group lambs

Time intervals	Respiration rate (per min)		Heart rate (per min)		Body temperature (°C)	
	experiment (n=5)	control (n=5)	experiment (n=5)	control (n=5)	experiment (n=5)	control (n=5)
Before castration M±m	25.4±0.97	26.6±0.58	70.0±0.7	70.2±0.58	38.0±0.05	38.2±0.25
At hour 6 after castration M±m	28.0±1.17	30.4±1.36	70.8±0.9	74.6±1.36	38.7±0.3	39.6±0.05
At hour 24 after castration M±m	25.8±1.36	28.6±0.78	71.6±0.7	73.0±1.17	38.4±0.13	39.0±0.21
P	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001

At hour 6 after castration, respiration rate, heart rate and body temperature of experimental group kids ranges from 25 to 29, 76 to 80 and 39.1 to 40.3 respectively, whereas these parameters in control group kids changed from 29 to 34, 76 to 83 and 39.8 to 41.0 respectively. But at hour 24,

respiration rate, heart rate and body temperature of experimental group kids ranged between 24 and 28, 74 and 81, and 38.3 and 39.0 respectively, while they are between 28 and 31, 75 and 81, and 38.5 and 39.6 respectively in control group (table 2).

Table 2

Results of comparison of clinical parameters of experimental and control group kids

Time intervals	Respiration rate (per min)		Heart rate (per min)		Body temperature (°C)	
	experiment (n=5)	control (n=5)	experiment (n=5)	control (n=5)	experiment (n=5)	control (n=5)
Before castration M±m	24.0±0.78	24.8±0.97	75.0±1.56	74.8±0.58	39.0±0.25	38.8±0.25
At hour 6 after castration M±m	27.2±0.78	31.6±0.58	79.4±1.36	80.2±1.36	38.8±0.23	38.8±0.23
At hour 24 after castration M±m	26.0±0.78	29.4±0.58	76.6±1.17	78.4±1.17	38.6±0.07	38.6±0.07
P	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001

At hour 6 after castration, respiration rate, heart rate and body temperature of experimental group calves ranges from 16 to 18, 62 to 73 and 38.6 to 39.5 respectively, whereas these parameters in control group calves changed from 17 to 18, 69 to 73 and 39.5 to 40.0 respectively. But at hour 24,

respiration rate, heart rate and body temperature of experimental group calves ranged between 15 and 18, 60 and 73, and 38.3 and 38.7 respectively, while they are between 17 and 19, 62 and 70, and 39.2 and 39.7 respectively in control group (table 3).

Table 3

Results of comparison of clinical parameters of experimental and control group calves						
Time intervals	Respiration rate (per min)		Heart rate (per min)		Body temperature (°C)	
	experiment (n=5)	control (n=5)	experiment (n=5)	control (n=5)	experiment (n=5)	control (n=5)
Before castration M±m	16.6±0.78	16.3±0.58	62.6±1.75	61.3±1.36	38.3±0.09	38.7±0.29
At hour 6 after castration M±m	17.3±0.39	18.3±0.19	66.6±2.14	71.0±0.39	39.4±0.07	39.7±0.09
At hour 24 after castration M±m	16.3±0.58	17.3±0.58	64.6±1.17	66.3±1.56	38.5±0.07	39.3±0.13
P	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001



Photo 3. Atrophy of testicles of castrated lamb (At day 30)



Photo 4. Atrophy of testicles of castrated calf (At day 180)



Photo 5. Atrophy of testicles and contraction scrotum after 7 months after of castration



Photo 6. Incomplete atrophy of testicles 7 months of castration

3.3. Study of testicle atrophy in the body of castrated animal

At day 30 after castration of experimental group lambs and kids cremaster fascia of testicles thickened, the gaps started to appear between seminiferous tubules, and Sertoli cells are broken and differentiation of Leydig cells reduced in basal membrane of tubule wall.

Multiplication, growth and developmental stages of spermatozoa in the wall of seminiferous tubule of parenchyma of testicles become abnormal and

cellular divisions are ceased, and therefore cellular nucleus is stained weakly. At day 60, thickening of outer capsule of seminiferous tubule of testicle parenchyma increased rapidly, Sertoli cells become absent in testicular parenchyma of lamb, and cellular nucleus is stained very weakly and only cytoplasm is stained as a whole. Cell debris appear in interstitial tissue between seminiferous tubule and Leydig cells become not developed. For kids, broken Leydig cells are rarely found in reticular and soft connective tissues between seminiferous tubule of testicles.

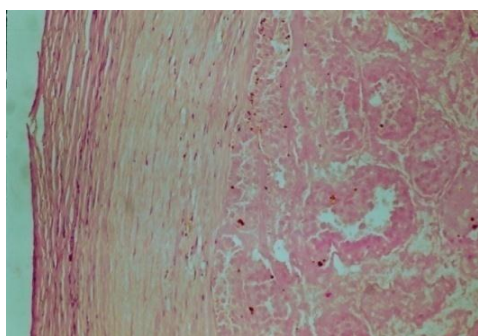


Photo 7. Thickening and breaking of capsule of seminiferous tubule wall of kid testicle at day 60. HE stain x 200

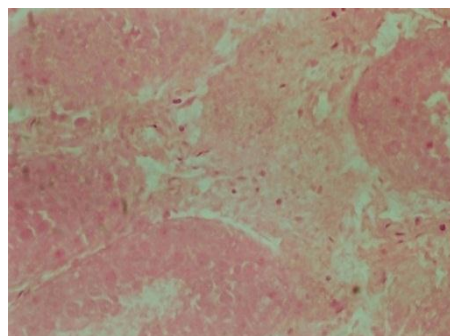


Photo 8. Cellular nuclei are not stained, while cytoplasm is stained in seminiferous tubule of lamb testicle (at day 60) HE stain x 400

DUSCUSSION

Because livestock populations are open pasture based under constant natural and climatic impacts all year round, we attempted to discuss our study results in association with studies of other researchers that sudden climatic changes and severe weather conditions cause much difficulties to provide stable growth of livestock populations, increase animal production, and enhance their economic benefits [1,2,3,4 and 5].

In the last years it is demonstrated that unopened castration of male animals is essential during current period of becoming the increased soil pollution in association with natural and ecological changes and mining industry as main causes of morbidity and mortality of various species animals.

Our herders use open castration method under improper condition regardless of changes of metabolism levels and body weight of lambs and kids at 2-3 months old age and calves at 13-15 months old age.

In the present study, examining the averages of clinical parameters in both experimental and control lambs revealed respiration rate, heart rate and body temperature were 25.4 ± 0.97 , 70.0 ± 0.7 and 38.0 ± 0.05 respectively, which are in agreement

with the study of N.Gurjav (1964), while they were lower than those studied by T.Sodnoi (1981).

According to our study, clinical parameters of experimental group lambs at hour 6 after castration respiration rate, heart rate and body temperature reached 28.0 ± 1.17 or increased by 9.3%, 70.8 ± 0.9 or by 1.2%, and 38.7 ± 0.3 or by 1.9%. As compared to control group the respiration rate, heart rate and body temperature are lower by 7.9%, 5.1% and 2.3% respectively. Comparison of clinical parameters of both experimental and control group animals at hour 24, the respiration rate, heart rate and body temperature are lower 9.8%, 2% and 1.6% respectively.

Clinical parameters of experimental group kids at hour 6 after castration respiration rate, heart rate and body temperature reached 27.2 ± 0.78 or increased by 11.8%, 79.4 ± 1.36 or by 1.0%, and 38.8 ± 0.23 or by 3.3%. As compared to control group the respiration rate, heart rate and body temperature are lower by 14%, 1.0% and 3.3% respectively. Comparison of clinical parameters of both experimental and control group animals at hour 24, the respiration rate, heart rate and body

temperature are lower 11.6%, 2.3% and 1.1% respectively.

Clinical parameters of experimental group calves at hour 6 after castration respiration rate, heart rate and body temperature reached 17.3 ± 0.39 or increased by 4.1%, 66.6 ± 2.14 or by 6.1%, and 39.9 ± 0.07 or by 1.8%. As compared to control group the respiration rate, heart rate and body temperature are lower by 4.8%, 6.2% and 1.8% respectively. Comparison of clinical parameters of both experimental and control group animals at hour 24, the respiration rate, heart rate and body temperature are lower 5.8%, 2.6% and 2.1% respectively.

As concluded from above study results, castration of lambs, kids and calves by unopened method severity of injury on scrotal neck and spermat

cord is less and re-absorption swellings and hematoma in affected side exerts less effects on animal body [6,7 and 8].

Weaker differentiation and disappearance of Sertoli cells, and degradation of Leydig cells were observed in the wall of seminiferous tubule of testicles of lambs and kids castrated by unopened method.

Of all experimental group animals (n=10), 8 animals, including 5 kids and 3 lambs had fully absorbed testicles, while two lambs had incompletely absorbed testicles. Testicles of 5 kids of experimental group were fully absorbed in their body via reduction of their protein within 3 months, while testicles of 2 lambs experimental group within 4-5 months.

CONCLUSION

1. Biologically active matters produced during testicular atrophy exert bio-stimulator like effects spreading via blood flows, result in changes of metabolic processes, intensify fattening, and enhance body weight gain for shorter period.
2. The method is progressive because it is economically beneficial and saves time, causes

no any complications, and effective to do during any seasons.

3. Advanced method of castration regarding the physical and sexual maturity of male animals is fully feasible to be introduced into animal husbandry practice.

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