قسم : التوليد والتناسليات والتلقيح الصناعي .
كلية : الطب البيطرى - جامعة أسيوط .
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دراسات على نشاط الانزيمات وصورة الدم وعلاقتها بصورة الرحم الى وضع ما قبل الولادة

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اشتملت الدراسة على ٢١ بقرة فريزيان و٢٨ جاموسة من حيوانات كلية الزراعة جامعة أسيوط ، وقد تم دراسة التغييرات في ابعاد الرحم وعنقه اسبوعيا حتى تم عودته الى وضع ما قبل الولادة تقريبا .

كذلك دراسة التغيرات في مستوى انزيم جلوتاميك اكسال استيك ترانس امينيز والجلوتاميك بيروفك ترانس اميتيز وانزيم الفوسفاتيز القاعدى . كما تم دراسة التغييرات في عدد كرات الدم الحمراء والبيضاء وحجم كرات الدم المضغوطة وكذلك مستوى الهيموجلوبين بالاضافة الى دراسة مستوى الجلوكوز في السيرم اسبوعيا ولمدة ستة أسابيع بعد الولادة .

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STUDIES ON SERUM ENZYMATIC ACTIVITY AND BLOOD PICTURE IN RELATION TO UTERINE INVOLUTION IN COWS AND BUFFALOES

(With 4 Tables)

By
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SUMMARY

A total of 21 Freisian cattle and 28 buffalo cows were included in this study. Animals were selected from those belonging to Assiut Faculty of Agriculture farm.

The changes in the measurements of the gravid, non-gravid horn as well as the cervix were studied weekly tell six weeks after parturition.

The changes in serum enzymatic activity (SGOT, SGPT and SAP) and the changes in the blood picture (RBC, Hb, P.C.V. and WBc) as well as the serum glucose level were studied weekly after parturition till complete uterine involution occurred.

INTRODUCTION

" Involution " denotes those retrogressive changes that occur in the female genital tract to return to almost its normal pre-gravid state (ROBERTS, 1971).

CASIDA and VENZKE, (1936); RASBECH, (1950); MALKMUS and MIEBNER (1959) reported that, involution of the cow's uterus following normal birth is complete after 25 - 36 days. In more recent investigations BUCH et al. (1955), ROBERTS (1971) and EL-NAGGAR (1977) recorded a range from 47 to 53 days for complete uterine involution in cattle.

In Buffaloes, ROY and LUKTUKE (1962) reported that between 30 and 60 days post partum, involution was complete in 88.5% of animals. Moreover, they found that the rate of involution was repid up to 14 day post partum, gradually decreasing thereafter. Similar results were obtained by EL-EISHY (1965) and EL-FADALY (1978).

The available literature lacks data concerning the inerrelationship between blood picture and serum enzymatic activity and uterine involution for buffaloes or for cows. The aim of this work was to study the uterine involution and the corresponding changes in the blood picture, serum enzymatic activity as well as the serum glucose level in Freisian cows and buffaloes.

MATERIAL and METHODS

The animals included in this study were normally calving 28 buffaloes (13 primipara and 15 pluripara) and 21 Freisian cows (8 primipara and 13 pluripara).

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Rectal examination of the reproductive organs of each animal was performed weekly till complete involution. The diameter of the two horns at the bifurcation as well as that of the cervix were estimated by fingers (on the base of that one finger is about 1.5 cm in breadth).

Involution of the uterus was recorded to be complete when the whole uterus had returned to its intra-pelvic position or near the pelvic brim, when the horns had became nearly identical in size and consistency and when the genital traet had regained its normal tonicity and consistency as in the non-pregnant state (BUCH et al., 1955). During examination of the animals, the character of lochia was also recorded with regard to its colour, odour, amount and consistency.

Before rectal examination two blood samples were collected from the jugular vein of each animal. The 1st was used to obtain clear sera for the estimation of glutamic oxalacetic transaminase (GOT), glutamic pyruvic transaminase (GPT), alkaline phosphatase (AP) and glucose level. Serum transaminases (S-GOT, S-GPT) activities were determined according to the method of REITMAN and FRANKEL (1957). Serum alkaline phosphatase activity was determined by the micromethod described by SOMMER (1954) while serum glucose was determined after FOLIN and WU (1929). The chemicals used were upplied in Test Kits provided by Merk, Darmstadt (West Germany) were used for the above mentioned measurements.

The 2nd blood saple was mixed with anticoagulant (heparin) and used for the determination of red blood cells count (R.B.C. Million/mm), white blood corpusles (W.B.C. Thous/mm), haemoglobin (Hb/gm %) and packed cell volume (P.C.V. %) COLES, 1980).

Statistical analysis of the data were done according to SNEDECOR and COCHRAN (1967).

RESULTS

The obtained results regarding the involutionary changes in the cervix and uterus of cows and buffaloes are presented in table (1 - 2). The corressponding changes in the serum enzymatic activity and the blood picture as well as the serum glucose level are presented in table (3 - 4).

DISCUSSION

The obtained results showed that the gravid horn in both primiparous and pluriparous buffalo showed marked decrease in the diameter from the 1st to the 2nd week post-partum. The average was 8.9 $\pm$ 1.2, 3.6 $\pm$ 0.96 cm and 9.6 $\pm$ 1.71, 6.9 $\pm$ 1.22 during the 1st and 2nd week in primipara and pluripara respectively. This was followed by slower decrease in the mean diameter till the end of the 5th week in primipra and in pluripara (table 1). Our results agree with those recorded by CASIDA and VENZKE, (1936); RASBECH, (1950); MALKMUS and MIEBNER (1959) and RUSSE (1968); who reported a range of 25 - 36 days for complete involution after normal parturition in cattle. Similar results were obtained by PERKINS and KIDDER, (1963); MOLLER, (1970) and TAKEUCHI et al (1971) who reported an average of 37, 31.59 and 32.1 days for complete involution of the uterus in cattle respectively. On the other hand, BUCH et al. (1955), ROBERTS, (1971) and EL-NAGGAR (1977) recorded higher values (47 - 53 days). This may be attributed to age, breed or nutitional variations. ROY and LUKTUKE (1962) recorded 5 days difference in the involution time of the uterus in two buffalos. SLOSS

and DUFTY (1980) cited that the involution time tends to be longer among the larger or heavier beef cattle than in the smaller dairy breeds. Moereover, they mentioned that within each breeds, the rate of involution decreases with an increase in age, parity and is slowest during winter months.

In cattle (primipara and pluripara), the marked reduction in the diameter of the non-gravid horn was observed during the 1st week after calving. However, no significant decrease in the diameter was observed after the end of the 2nd week in primpipara and after the end of the 3rd week in pluripara (table 1). Such results agreed completely with the finding of RASBECH (1950) that the involution of the uterus in cattle was complete in primipara within 18-20 days and in pluripara within 20 - 25 days. Similar results were reported by RUSSE, (1968); HAFEZ, (1980) and SLOSS and DUFTY (1980) in cattle and EL-FADALY (1978) in buffaloes.

On the other hand, TANNANT et al. (1967) and MOLLER, (1970) reported that the age had no effect on the uterine involution time in cows.

With regard to the involutionary changes of the cervix of the cows the greatest reduction in diameter occured during the 2nd week after parturition (table 1). However, no noticable decrease in the diameter of the cervix of the primipara was observed after the end of the 4th week, while that of the pluripara showed slight gradual decrease in the diameter till the end of the 5th week after calving. Similar results were reported by MORROW et al. (1969) in cattle and EL-WISHY (1965) and EL-FADALY (1978) in buffaloes, Moreover, ABUSINEINA (1969) reported that about 75% of the cervical closure in cattle occurred within 48 hours after parturition.

The involutionary changes of the gravid and non-gravid horn as well as the cervix of buffaloes (Primipara and Pluripara) were found to be nearly similar to those of cattle (table 2).

In all studied material, the serum transaminase activity (S-GOT and S-GPT) showed the highest value during the first week after calving (table 3 - 4). Since great muscular effort is exerted during the process of calving such higher values were expected. CORNELIUS and KANEKO (1963) and LATNER (1975) mentioned that prolonged severe excercise in normal animals and man increased the level of serum transaminases. This also may be due to the hormonal changes that occurs during the last stages of gestation and early postpartum period. DAVIS et al. (1966) stated that estrogen, progesterone and testesterone hormones affect the activity of both transaminase enzymes. Moreover, BOOTS, et al. (1969) and LATNER (1975) cited that the varying relationship between the sex hormones and the transaminase enzymes could explain the change in the enzyme activity with age.

In both cattle and buffaloes the primipara possesed a significantly ($P/__ 0.01$) higher values of S-GOT and S-GPT than pluripara. This may be attributed to age variations. Similar results were reported by MOTTELIB and SALEM (1980) in Friesian and Jersey cattle and buffaloes.

In primipara (cattle and buffaloes), the serum enzymatic activity (S-GOT, S-GPT and S-AP) showed gradual decrease till the 3rd week after parturition where no significant change in the serum level of the S-GOT and S-AP was observed thereafter. However, the S-GPT continued to decrease till the 5th week in primiparous buffaloes (table 3 - 4). In pluriparous cattle, the serum level of the three enzymes showed gradual decrease tell the 6th week after calving. However, in pluriparous buffaloes, S-GOT, S-GPT and S-AP level continued to decrease tell the 4th, 5th week after parturition respectively. Since the enzymes have its normal function

withen the cells, an increase level reflects cellular destruction (COLES, 1980). This is suported by the statement of SALISBURY, (1978) and HAFEZ (1980) that involution of the maternal caruncle involves degenerative vascular changes, peripheral ischemia, necrosis and slaughing of the caruncular tissue. Moreover, HAFEZ (1980) mentioned that the surface of the bovine caruncle which is devoid of epithelium immediatly after parturition begins to regenerate 12 to 14 days post partum by proliferation from the surrounding tissues, it is completely restablished in most normal cows within 30 day after parturition.

In all studied material, the lowest values regarding R.B.C., PCV, and HB levels were obtained during the first week after calvings (table 3 and 4). This may attributed to the large amount of colostrum which is rich in proteins specially gama globulins which is nesessary for the defence mechanism of the newly born calf. SHALM (+965) stated that low Hb concentration can indicate low protein status. ROWLANDS et al. (1975) mentioned that Hb concentration decreased with increasing milk yield. He also recorded a significant difference in the Hb concentration between the lactating and non lactating cows.

Concerning the WBC count, there was a gradual increase after porturition (table 3, 4). SHALM (1965) cited that the blood picture of the recently calving cows is typical of a mild or moderate response to stress, a lecukocytosis occurs due to an increase of neutrophils of about 100%. This may due to secretion of ATCH which secreted by the adrenal cortex under condition of stress (DOUGHERTY and WHITE, 1944). SLOSS and DUFTY (1980) reported similar results.

In both cows and buffaloes, the serum glucose level was the lowest during the first week post-partum (table 3 & 4). ROWLANDS et al. (1975) stated that the serum glucose levels were in average lower in early lactation than at other times. Similar results were reported also by HARZ and GRAF, (1976); McCLURE, (1977) and PARKER (1977). This may due to drop in the glucocorticoid level (which are involved in glucose formation) after delivery of the foetus. SLOSS and DUFTY (1980) recorded that the corticosteriod level lie between 10 and 20 mg/ml on the day of parturition and fall rapidly after delivery of the foetus to a basal value of 3 to 6 mg/ml.

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Table (1): Post-partum measurements (cm) of the genital tract of buffaloes.

Post-partum period	Primipara			Pluripara		
(week)	cervix	gravid horn	non-gravid horn	cervix	gravid horn	non-gravid horn
1	10.2±2.9	8.9 ±1.12	6.9 ±0.76	10.1±2.61	9.6 ±1.71	7.4 ±1.42
2	4.25±1.81	3.6 ±0.96	4.4 ±0.42	6.54±1.26	6.9 ±1.22	4.6 ±0.59
3	3.44±0.89	3.5 ±0.46	3.7 ±0.48	6.52±1.39	4.8 ±0.89	3.2 ±0.45
4	3.40±0.65	2.92±0.52	2.61±0.52	4.25±0.79	4.9 ±0.76	3.2±0.37
5	2.98± 54	2.68±0.39	2.63± 21	3.5 ±0.37	3.3 ±0.66	3.2 ±0.36
6	2.97± 52	2.65±0.48	2.60±0.34	3.5 ±0.32	3.3 ±0.49	3.2 ±0.38

± = Standard deviation

Table (2): Post-partum measurements (cm) of the genital tract of cows.

Post-partum period	Primipara			Pluripara		
week	Cervix	gravid horn	non gravid horn	Cervix	gravid horn	non gravid horn
1	7.56±0.89	8.21±1.39	4.75±1.20	8.72±0.82	10.13±1.79	5.98±1.22
2	5.03±0.76	5.49±1.03	3.97±0.98	6.21±0.67	6.22±1.23	4.63±1.02
3	3.72±0.55	3.52±0.98	2.39±0.56	4.07±0.55	4.06±1.02	3.79±0.72
4	2.36±0.32	2.48±0.62	2.33±0.48	3.37±0.42	3.62±0.89	2.57±0.65
5	2.36±0.27	2.45±0.48	2.31±0.62	2.89±0.38	3.55±0.67	2.52±0.59
6	2.36±0.35	2.45±0.48	2.32±0.37	2.82±0.36	3.55±0.78	2.52±0.59

± = Standard deviation

Table (3): Serum enzymatic activity, blood picture and serum glucose level in cows (post partum period)

Week	Primipara								Pluripara							
	SGOT mu/ml	SGPT mu/ml	SAP mu/ml	RBC 10^6/ml	Hb gm%	PCV %	WBC 10^6/ml	glucose mg%	SGOT mu/ml	SGPT mu/ml	SAP mu/ml	RBC 10^6/ml	Hb gm%	PCV gm%	EBC 10^6/ml	glucose mg%
1	42.4 ± 2.1	18.9 ± 1.6	32.4 ± 2.1	4.9 ± 0.69	9.5 ± 0.17	23.5 ± 0.22	7.0 ± 0.54	38.5 ± 1.21	39.9 ± 2.0	16.2 ± 1.7	9.8 ± 1.1	4.4 ± 0.36	8.9 ± 0.56	22.1 ± 0.19	7.6 ± 0.42	36.3 ± 1.11
2	40.6 ± 2.3	17.3 ± 1.4	28.1 ± 1.9	4.8 ± 0.58	9.3 ± 0.15	24.6 ± 0.28	8.1 ± 0.66	39.4 ± 1.62	39.7 ± 2.0	16.4 ± 1.4	10.6 ± 1.3	4.5 ± 0.40	9.7 ± 0.78	24.7 ± 0.24	6.8 ± 0.92	43.7 ± 1.31
3	31.6 ± 1.9	17.4 ± 1.4	27.1 ± 1.4	5.3 ± 0.42	10.3 ± 0.48	25.0 ± 0.32	9.5 ± 0.78	40.6 ± 1.57	25.4 ± 1.3	15.1 ± 1.1	8.4 ± 1.00	5.1 ± 0.61	10.0 ± 1.00	26.1 ± 0.32	9.4 ± 1.8	45.6 ± 1.46
4	28.2 ± 1.5	16.5 ± 0.68	19.9 ± 1.6	6.3 ± 0.71	12.4 ± 0.50	27.8 ± 0.41	9.6 ± 0.78	54.4 ± 2.20	18.4 ± 0.98	14.7 ± 9.96	7.5 ± 0.79	4.9 ± 0.57	10.2 ± 0.99	28.2 ± 0.33	9.6 ± 2.0	51.2 ± 1.37
5	27.8 ± 1.8	17.2 ± 1.0	20.6 ± 1.8	5.6 ± 0.65	11.8 ± 0.47	28.1 ± 0.50	9.6 ± 0.78	53.2 ± 2.41	17.9 ± 0.76	15.2 ± 1.1	6.1 ± 1.7	5.5 ± 0.76	10.5 ± 1.12	28.2 ± 0.33	9.8 ± 1.9	50.6 ± 1.92
6	28.3 ± 1.4	16.6 ± 0.98	18.5 ± 1.4	6.1 ± 0.56	12.0 ± 0.48	28.9 ± 0.68	11.1 ± 1.9	57.9 ± 2.92	18.6 ± 1.1	14.6 ± 0.82	6.2 ± 2.1	5.4 ± 0.80	10.4 ± 0.89	28.6 ± 0.35	9.7 ± 2.1	50.4 ± 1.78

Table (4): Serum enzymatic activity, blood picture and serum lucose level in buffaloes (post partum period).

Week	Primipara								Pluripara							
	SGOT mu/ml	SGPT Mu/ml	SAP mu/ml	RBC 10^6/ml	Hb gm%	PCV %	WRC 10^6/ml	glucose mg%	SGOT mu/ml	SGPT mi/ml	SAP mu/ml	RBC 10^6/ml	Hb gm%	PCV %	WBC 10^6/ml	glucose mg%
1	46.3 ± 3.1	24.2 ± 2.2	27.4 ± 1.1	5.2 ± 0.62	11.2 ± 0.48	37.3 ± 0.49	7.4 ± 0.52	40.22 ± 2.64	34.2 ± 2.4	18.5 ± 2.1	12.6 ± 1.1	5.7 ± 0.23	12.3 ± 0.71	37.0 ± 0.99	8.1 ± 0.68	44.25 ± 1.44
2	42.4 ± 2.6	22.3 ± 1.9	27.3 ± 1.6	5.05 ± 0.64	11.6 ± 0.32	37.5 ± 0.62	8.6 ± 0.62	39.81 ± 1.9	35.6 ± 2.3	17.3 ± 1.7	8.4 ± 1.9	5.8 ± 1.2	12.0 ± 0.49	7.9 ± 1.1	7.9 ± 0.93	48.22 ± 1.65
3	33.9 ± 2.2	19.6 ± 1.8	17.6 ± 2.1	5.7 ± 0.56	13.1 ± 0.49	37.0 ± 0.33	9.2 ± 0.89	41.7 ± 3.1	30.0 ± 1.6	17.6 ± 1.9	7.1 ± 2.6	6.1 ± 5.8	12.6 ± 0.27	37.8 ± 1.3	10.1 ± 1.32	54.9 ± 1.78
4	31.7 ± 2.1	18.3 ± 1.9	17.8 ± 1.9	5.7 ± 0.32	12.0 ± 0.54	37.8 ± 0.53	9.3 ± 1.7	50.81 ± 1.8	27.2 ± 1.4	16.0 ± 1.5	5.5 ± 1.9	5.9 ± 0.33	11.9 ± 0.32	38.7 ± 0.89	9.1 ± 1.32	55.69 ± 1.51
5	29.8 ± 2.1	16.2 ± 1.0	17.1 ± 1.8	6.2 ± 0.48	12.7 ± 0.37	38.6 ± 0.42	9.6 ± 1.9	60.89 ± 1.1	22.0 ± 1.5	12.4 ± 1.3	4.8 ± 1.7	6.4 ± 0.42	12.7 ± 0.69	38.9 ± 1.2	7.9 ± 0.93	59.30 ± 1.42
6	30.0 ± 1.9	15.91 ± 1.0	17.1 ± 1.3	6.3 ± 0.50	12.8 ± 0.71	39.2 ± 1.33	10.1 ± 2.1	66.41 + 4.2	22.0 ± 1.4	12.5 ± 1.1	4.7 ± 1.4	6.6 ± 0.78	10.2 ± 0.56	39.8 ± 1.6	8.1 ± 1.88	60.70 ± 3.20