J. Agric. Sci. Mansoura Univ., 34 (3): 1697 - 1707, 2009

EFFECT OF RBST TREATMEN ON PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF EWES

Abdel-Khalek,A. E.*; T.A.M.Ashmawy and Heba A. Abouelwafa****
*** Animal Production Dept., Faculty of Agriculture, Mansoura University**
**** Animal Production Research Institute, Agricultural Research Center**

ABSTRACT

This study was carried out at Sakha Animal Production Research Station, belonging to Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture. The current work aimed to study the effect of rbST treatment during pre- and postpartum period on live body weight, milk production, composition and lambing rates of crossbred ewes (1/2 Finnish Landrace x 1/2 Rahmani).

A total number of 40 mature healthy crossbred ewes (1/2 Finnish Landrace x 1/2 Rahmani) having 3-4 years of age were divided into two similar groups (control and treatment), according to their live body weight (LBW). Ewes in the first group were served as a control group, while those in the second group were treated with a subcutaneous injection of 160 mg recombinant bovine Somatotropin (rbST) at 14-day interval during one-month prepartum and 4 months postpartum. During May mating season, ewes were monitored for sign of oestrus and those observed in heat were natural mating using 4 fertile rams. Milk yield and composition were determined throughout first 8 lactation weeks. Results show that LBW of ewes at prepartum and early postpartum suckling period was not affected by rbST treatment. However, treated ewes were heavier ($P<0.05$) by about 5% than controls only during late postpartum (breeding season from April to June). Treatment with rbST increased ($P<0.05$) average daily milk yield of ewes during the 1st eight weeks of lactation. The magnitude of increase ranged between 16 and 33% during different lactation weeks. Treatment with rbST decreased ($P<0.05$) contents of fat, protein and in turn total solids in milk of ewes during the first 2 months of lactation. However, lactose and ash contents in milk of ewes were not affected significantly by rbST treatment. Treatment with rbST increased ($P<0.05$) oestrus/mating rate (40 vs. 70%) and reduced postpartum period of lambing ewes by about one month as compared to untreated ewes (65 *vs.* 93 days). Lambing rate based on number of mated ewes was significantly ($P<0.05$) lower in control than in treated ewes (75 *vs.* 85.7%).

In conclusion, injection of 160 mg rbST at 14-day interval during one-month prepartum and 4 months postpartum improved milk yield and lambing rate of ewes.

Keywords: rbST, ewes, productive, reproductive performance

INTRODUCTION

Bovine growth hormone can be administered to sheep (McDowell *et al*., 1988 and Sandles *et al*., 1988), apparently because the hormones of both species have almost identical amino acid sequences (Miller and Eberhardt, 1983). Fernandez *et al*. (1995) first administered a prolonged-release formula of rbST to dairy ewes. Generally, administration of rbST to lactating dairy cows increased the yield of milk production. The magnitude of response to particular rbST depends on biological variation, stage of lactation and management parameters (Akers, 2002 and Roginski *et al*., 2003).

For lactating ewes, a few experiments have been carried out with rbST, but none has used a sustained-release formulation. For example,

Westbrook *et al*. (1993) utilized the immunization against somatotropin release-inhibiting factor, Sandles *et al*. (1988) used daily rbST injections and McDowell *et al*. (1987) used intra-arterial infusions of growth hormone. In lactating dairy ewes, Fernandez *et al*. (1995) showed that rbST treatment increased milk yield ($P<0.01$) over the control during different lactation weeks. The largest increase in milk yield was at 160 vs. 80 or 240 mg of rbST by which milk yields increased by 34.1 and 53.2% during 3-8 and 11-23 weeks lactation, respectively. Milk composition is not changed by rbST administration (Downer *et al*., 1993), but milk fat content can be increased at the beginning of lactation (Bitman *et al*., 1984), and milk protein can be reduced at higher rbST doses (Eppard *et al*., 1985).

Many studies have been evaluated the effects of rbST on dairy cow reproduction. These effects of rbST on reproduction were related to rbST dose-time of initiation of treatment, time of initiation of breeding and control of other factors such as nutritional status and milk production of cows (Esteban *et al*., 1994).

The galactopoletic effects of rbST are well established in sheep (Stelwagen *et al*., 1993) and dairy goats (Knight, 1992). However, a few studies have been investigated the effect of rbST on milk production in lactating dairy ewes. The milk yield responses to rbST treatment in sheep are more variable than that in cows (Davis *et al*., 1999). Therefore, the current work aimed to study the effect of rbST treatment (160 mg/ewe at 14-day interval) during pre- and postpartum period on productive (LBW and milk production) and reproductive performance (oestrous and lambing rates) of crossbred ewes (1/2 Finnish Landrace x 1/2 Rahmani).

MATERIALS AND METHODS

This study was carried out at Sakha Animal Production Research Station, belonging to Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture.

A total number of 40 mature healthy crossbred ewes (1/2 Finnish Landrace x 1/2 Rahmani) having 3-4 years of age were divided into two equal groups (control and treatment), according to their live body weight. Ewes in the first group were served as a control group without injection, while those in the second group were treated with a subcutaneous injection of 160 mg rbST according to Fernandez *et al*. (1995) (Sometribove; Monsanto Europe, Brussels, Belgium) at 14-day intervals from one month prepartum up to insemination. The experimental period consisted of three intervals, late pregnancy (1 month prepartum), suckling (2 months postpartum) and breeding season.

Animals were fed according to NRC (1985) allowances. All animals were fed concentrate feed mixture (CFM) allowances in two parts at 9 a.m. and 4 p.m. daily. The amounts of CFM were adjusted according to the physiological stage and production. All animals were kept under equal management conditions and were kept in a semi-open shaded yard during the experimental period. Fresh water was available all times.

During the transition period pre-mating season in May, ewes were monitored for oestrous signs by introducing well trained ram to ewes two times daily (at 8.0 a.m. and 4.0 p.m.). Live body weight was biweekly recorded from the beginning to end of the experiment. Number of ewes exhibiting oestrus were determined and those observed in heat were mated using 4 fertile rams.

Milk yield was weekly recorded after lambing throughout 8 lactation weeks using milk suckling technique. Lambs were isolated from their mothers during previous night and body weight was recorded (to the nearest 5 gm) at the morning (7.0 a.m.) and left them to suckling from their dams for 30 minutes, then body weight for lambs was recorded again. The residual milk was hand milked and recorded. Similar procedure was repeating at the evening suckling at 5.30 p.m. The differences in lamb weight before and after suckling (the two sucklings) were added to give daily intake of suckling lambs. Milk intake plus milk removed by hand milking represented daily milk yield. All lambs were weaned irrespective of weight around 12 kg LBW after about 8-10 weeks as a suckling period.

Milk samples representing morning and evening milkings were taken from five ewes in each group during suckling period (8 weeks) to determine milk composition. Fat percentage was determined using the Gerber's method as described by B.S.I. (1952). Protein percentage was determined by means of micro-Kjeldahl procedure according to Ling (1963). Percentage of total solids (B.S.I., 1952), lactose (Barnett and Abdel-Tawab, 1957) and ash (A.O.A.C., 1984) were also determined.

Data were statistically analyzed according to Snedecor and Chocran (1982). Duncan Multiple Range Test was used to test the differences among means (Duncan, 1955).

RESULTS AND DISCUSION

Effect of rbST treatment on productive performance of ewes:

Change in live body weight:

Results in Table (1) show that LBW of ewes at late prepartum and early postpartum (suckling period) was not affected by rbST treatment. However, treated ewes were significantly ($P<0.05$) heavier by about 5% than controls only during late postpartum (May breeding season) during the period from April to June.

The present insignificant effect of rbST injection on LBW of ewes in this study during prepartum and suckling periods was reported in multiparous Angora does injected with rbST (100 mg/kg BW/d) by Davis *et al*. (1999). Also, Binelli *et al*. (1995) showed no differences in body weight of primiparous cows received rbST (29 mg/d) for 63 days.

On the other hand, Chalupa *et al*. (1996) observed that as rbST treatment increased, the body weight gain of cows decreased, therefore, the main effect of rbST was decreased body fat reflecting the partitioning of colories by rbST to milk at the expense of fat deposition.

Table (1): Live body weight (kg) of ewes in treatment and control groups during different physiological stages.

Period (day)	Experimental group		Significance
	Control	Treatment	
Late pregnancy (Jan.):			
30 days prepartum	53.3±0.19	53.3±0.44	NS
15 days prepartum	55.9±0.44	55.9±0.38	NS
At lambing	45.9±0.51	48.4±0.93	NS
Suckling period (Feb. - March):			
30 days postpartum	48.9±0.96	50.2±0.93	NS
60 days postpartum	49.5±0.98	50.8±0.64	NS
Mating period (April- June):			
90 days postpartum	49.9±0.96^{b}	52.2±0.52^{a}	*
120 days postpartum	50.4±0.98^{b}	52.6±0.60^{a}	*

$^{a\ and\ b}$: Means within the same row with different superscripts are significantly different at P<0.05.

Milk production:

Milk yield:

Data of milk yield presented in Table (2) show that rbST treatment significantly (P<0.05) increased average daily milk yield of ewes during the 1st eight weeks of lactation compared with the controls. The magnitude of increase ranged between 16 and 33% during different lactation weeks.

Table (2): Average daily milk yield (kg/h) during the suckling period of ewes in treatment and control groups.

Period (week)	Experimental group		
	Control	Treatment	Significance
1	0.433±0.006	0.475±0.011	NS
2	0.468±0.011^{b}	0.542±0.012^{a}	*
3	0.493±0.012^{b}	0.593±0.012^{a}	*
4	0.513±0.011^{b}	0.621±0.011^{a}	*
5	0.531±0.012^{b}	0.660±0.012^{a}	*
6	0.557±0.011^{b}	0.716±0.12^{a}	*
7	0.578±0.012^{b}	0.767±0.11^{a}	*
8	0.593±0.013^{b}	0.740±0.12^{a}	*

$^{a\ and\ b}$: Means within the same row with different superscripts are significantly different at P<0.05.

In accordance with the present results, many subsequent lactation studies substantiated the positive response of milk yield to rbST administration (Putuam *et al*., 1999) and the magnitude of milk yield response to rbST was reported to vary according rbST dose (Ocampo *et al*., 1995). In case of dairy sheep, Fernandez *et al*. (1995) showed that rbST treatment (160 mg every 14 days)showed the highest increase in milk yield (P<0.01) over the control by 34.1 and 53.2% during 3-8 and 11-23 weeks lactation, respectively. However, Davis *et al*. (1999) showed that milk yield insignificantly increased by 15% in Angora does injected with rbST (100

mg/kg BW/d) than control. The milk yield response to rbST treatment in goats and sheep is more variable than that in cows (Davis *et al*., 1999). In lactating dairy cows rbST treatment increased the yield of milk production by 10-15% (Akers, 2002 and Roginski *et al*. 2003).

Growth hormone is the major galactopioetic hormone in cows and is commonly used to increase milk yield in commercial dairy herds by affecting both mammogenesis and lactogenesis (Hull and Harvey, 2001). The galactopioetic effects of bST are well established in sheep (Stelwagen *et al*., 1993) and dairy goats (Knight, 1992).

Binelli *et al*. (1995) showed that the total RNA, concentrations, RNA accretion and the RNA to DNA ratio increased in the mammary tissues of cows treated with rbST. Total RNA is an index of cell metabolic activity. In heifers, Carstens *et al*. (1997) showed that treatment of rbST increased ($P<0.01$) the proportional weight of fat-free mammary parenchymal tissue by 82%, suggesting that rbST had a great impact on mammary gland development and subsequently milk producing capacity in dairy heifers.

Prosser *et al*. (1990) reported increase in milk yield of goats coincided with increased plasma concentrations of IGF-1. Many studies indicated that, via an effect on IGF-I, bST can delay involution of the mammary gland by reducing the activity of the plasminogen system, an important initiator of tissue remodeling during late lactation in dairy ruminants (Baldi, 1999 and Tonner *et al*., 2000).

It is of interest to note that quality of management will be the major factor affecting the magnitude of milk response to rbST. Factors that constitute the quality of the overall management program include the herd health program, milking practices, nutrition program and environmental conditions. It is important to ensure that the commercial use of rbST not only increases milk volume, but also improves the efficiency with which the milk is produced (Bauman, 1987).

Milk composition:

Also, rbST treatment induced significant ($P<0.05$) changes in chemical composition of milk, in particular of fat, protein and total solids percentage 1st eight weeks of lactation compared with the controls. Treatment with rbST significantly ($P<0.05$) decreased percentage of fat, protein and in turn total solids in milk of ewes during the 1st two months of lactation. However, lactose and ash percentage in milk of ewes were not affected significantly by rbST treatment (Table 3).

It is of interest to observe that the characteristics of milk from rbST-treated ewes are within the normal range of variation of milk from untreated ewes. In comparable with the present results, Fernandez *et al*. (1995) showed that rbST treatment increased fat content and decreased protein content, while lactose content was not affected in milk of ewes at 3-8 weeks lactation. However, no changes in milk composition (fat, protein, lactose and total solids) were observed in rbST-treated goats (Davis *et al*., 1999).

Table (3): Changes of milk composition during suckling period (week) of ewes in treatment and control groups.

Group	Suckling period (week)							
	1 wk	2 wk	3 wk	4 wk	5 wk	6 wk	7 wk	8 wk
Fat (%):								
Treat.	5.58 ±0.26	4.26 ±0.05	4.21 ±0.06	4.40 ±0.08	4.14 ±0.06	4.14 ±0.04	4.21 ±0.02	4.22 ±0.09
Control	6.31 ±0.18	5.24 ±0.19	5.19 ±0.19	5.34 ±0.24	5.02 ±0.25	4.88 ±0.21	4.84 ±0.21	5.12 ±0.27
Sign.	*	*	*	*	*	*	*	*
Protein (%):								
Treat.	4.13 ±0.04	4.01 ±0.06	3.91 ±0.05	3.81 ±0.10	3.99 ±0.10	3.99 ±0.08	4.02 ±0.15	3.77 ±0.13
Control	5.54 ±0.13	4.55 ±0.14	4.25 ±0.12	4.25 ±0.15	4.48 ±0.08	4.38 ±0.06	4.36 ±0.07	4.45 ±0.14
Signi.	*	*	*	NS	*	*	NS	*
Lactose (%):								
Treat.	5.12 ±0.01	5.13 ±0.04	4.35 ±0.07	4.30 ±0.04	4.44 ±0.01	4.31 ±0.04	4.26 ±0.04	4.44 ±0.11
Control	5.25 ±0.07	5.38 ±0.08	4.42 ±0.18	4.55 ±0.10	4.19 ±0.06	4.46 ±0.08	4.52 ±0.09	4.40 ±0.08
Signi.	NS	NS	NS	NS	NS	NS	NS	NS
Ash (%):								
Treat.	0.87 ±0.003	0.85 ±0.001	0.84 ±0.009	0.86 ±0.001	0.85 ±0.001	0.85 ±0.001	0.85 ±0.001	0.85 ±0.008
Control	0.81 0.001	0.85 ±0.004	0.82 ±0.007	0.84 ±0.009	0.84 ±0.009	0.85 ±0.005	0.85 ±0.008	0.85 ±0.006
Signi.	NS	NS	NS	NS	NS	NS	NS	NS
Total solids (%):								
Treat.	15.79 ±0.15	14.20 ±0.09	13.33 ±0.15	13.39 ±0.12	13.40 ±0.10	13.23 ±0.14	13.35 ±0.19	13.28 ±0.18
Control	16.91 ±0.20	15.87 ±1.51	14.81 ±0.08	14.79 ±0.21	14.55 ±0.27	14.89 ±0.23	14.58 ±0.14	14.83 ±0.43
Signi	*	*	*	*	*	*	*	*

[a and b]: Means within the same row with different superscripts are significantly different at P<0.05. * Significant group differences. NS:

Group differences are not significant.

According to Chalupa *et al*. (1996), the observed reduction in fat and protein contents in milk of ewes to rbST reflected the lower nutrient densities of the diets, because effects of rbST on milk composition seemed to be related to nutritional status.

The rbST did not affect milk composition when cows were fed diets providing positive balance of energy and protein (Bauman, 1992). The reduction in milk protein content with rbST dosages could be due to the increase in milk yield (Fernandez *et al*., 1995).

Reproductive performance:

Oestrous activity:

Results shown in Table (4) revealed that rbST treatment significantly (P<0.05) increased oestrus (mating) rate (40 vs. 70%) and lambing rate (75 *vs.* 85.7%), while postpartum period of lambing ewes reduced by about one month in treated as compared to untreated ewes.

Treatment with rbST has effects on ovarian function (Dela Sota *et al*., 1993). In cows, Rajamahendran *et al*. (1989) showed that cows receiving 10.3 mg of rbST required fewer services per conception (1.30) than 1.75 or 20.6 mg (1.81) cows. However, Chalupa *et al*. (1996) showed that the infertility was about 3 times greater for 41.2 mg rbST-treated cows than for untreated. The observed decreases in reproductive performance of dairy cattle treated with rbST may be attributed more to the increases in milk yield and short-term negative energy balance than to direct effects of rbST (Weller *et al*., 1990).

Table (4): Oestrous activity of ewes in treatment and control groups.

Item	Experimental group		
	Control	Treatment	Significance
Total number of ewes	20	20	-
Ewes exhibited oestrous activity	8	14	-
Oestrus (mating) rate (%)	40[b]	70[a]	*
Number of lambed ewes	6	12	-
Lambing rate (%)*	75	85.7	*
Postpartum period (days)	93±4.96[a]	65±3.47[b]	*

[a and b]: Means within the same row with different superscripts are significantly different at P<0.05. DO: Interval from lambing to mating.

*** Based on number of mated ewes**

It was suggested that the negative effect of supplemental rbST on fertility might be caused, in part, by lower oestrous detection rates in cows (Kirby *et al*., 1997). Exogenous rbST increased pregnancy rates in lactating dairy cows when administered at oestrus in repeat breeding cows (Morales-Roura *et al*., 2001) or when combined with a regimen for synchronization of ovulation and timed artificial insemination (Moreira *et al*., 2000 & 2001). Therefore, the noticed improvement in oestrus and lambing rates in our study may be attributed to that treated ewes exhibited oestrous activity were naturally mated by fertile rams. This may raise the possibility of that rbST administration to dairy ewes may have a positive effect on the endocrine and biochemical signals between the conceptus and maternal uterus at the time of pregnancy establishment.

In conclusion, injection of 160 mg rbST at 14-day interval during one-month pre-partum and 4 months postpartum improved milk yield and lambing rate of ewes**.**

REFERENCES

Akers, R. M. (2002). Lactation and the mammary gland. A Blackwell Publishing Company, Iowa State press, 2121 State Avenue, Ames, Iowa State, USA. www.iowastatepress.com.

A.O.A.C. (1984). Official methods of analysis, 14th ed. Association of Official Analytical Chemists. Washington DC.

Baldi, A. (1999). Manipulation of milk production and quality by use of Somatotropin in dairy ruminants other than cow. Domest. Anim. Endocrinol., 17(2-3):131.

Barnett, A. J. and G. Abdel-Tawab (1957). A rapid method for determination of lactose in milk and cheese. J. Sci. Food Agric., 8 (7):437.

Bauman, D. E. (1987). Bovine Somatotropin the Cornell Exper. Lence. Page 46 in Proc. Nath. Invitational workshop on bovine somatotropin, USA Ext. Ser Washington, DC.

Bauman, D. E. (1992). Bovine somatotropin. Review of an emerging- animal technology. J. Dairy Sci. 75: 1514.

Binelli, M. ; W. K. Vanderkool ; L. T. Chapin ; M. J. Vandhaar ; J. D. Turner ; W. M. Moseley and H. A. Tucker (1995). Comparison of growth hormone-releasing factor and somatotropin: Body growth and lactation of primiparous cows. J. Dairy Sci. 78: 2129.

Bitman, J . D . ; L . Wood ; H . F .Tyrell ; D . E . Bauman ; C . J . Peel ,; A . C . G . Brown and P . J . Reynolds (1984) . Blood and milk lipid responses induced by growth hormone administration to lactating cows. J . Dairy Sci. 67:2873.

B.S.I. (1952). Methods for the chemical analysis of cheese. British Standard Institute. (B.S.I.) No. 770.

Carstens, G. E. ; D. E. Glaser ; F. M. Byers ; L. W. Greene and D. K. Lunt (1997). Effects of bovine somatotropin treatment and intermitten growth pattern on mammary gland development in heifers. J. Anim. Sci. 75: 2378.

Chalupa, W. ; B. Vacchiarelli ; D. T. Galligan ; J. D. Verguson ; L. S. Baird ; R. W. Hemken ; R. J. Harmon ; C. G. Soderholm ; D. E. Otterby ; R. J. Annexstad ; J. G. Linn ; W. P. Hansen ; F. R. Ehle ; D. L. Palmquist and R. G. Eggert (1996). Responses of dairy cows supplemented with somatotropin during weeks 5 through 43 of lactation. J. Dairy Sci. 79: 800.

Davis, J. J. ; T. Sahlu ; R. Puchala ; M. J. Herselman ; J. M. Fernandez J. P. Mccann and S. W. Coleman (1999). The effect of bovine somatotropin treatment on production of lactating Angora dose with kids. J. Anim. Sci. 77:17.

Dela Sota, R.L ; M. C. Lucy ; C. R. Staples and W. W. Tacher (1993). Effect of recombinant bovine somatotropin on ovarian function in lactating and non-lactating dairy cows. J. Dairy Sci. 76:1002.

Downer, J. V.; D. L. Patterson ; D. W. Rock ; W. V. Chalupa ; R. M. Cleale ; J. L. Firkins ; G. L. Lynch J. H. Clark ; B. O. Brodie ; B. F. Jenny and R. De Gregorio (1993). Dose titration of sustained-release recombinant bovine somatotropin in lactating dairy cows. J. Dairy Sci. 76:1125.

Duncan, D. B. (1955). Multiple Range and Multiple F-test Biomatrics 11:10.

Eppard, P. J. ; D. E. Bauman and S. N. McCutcheon (1985). Effect of dose of bovine growth hormone on lactation of dairy Cows. J. Dairy Sci. 68:1109.

Esteban, E. ; P. H. Kass ; L. D. Weaver ; J. D. Rowe ; C. A. Holmberg ; C. E. Franti and H. Fred Troutt (1994). Reproductive performance in high producing cows treated with recombinant bovine somatotropin. J. Dairy Sci. 77:3371.

Fernandez, N. ; M. Rodriguez ; C. Peris ; M. Barceld ; M. P. Molina ; A. Torres and F. Andiaens (1995). Bovine somatotropin titration in lactating dairy ewes. Milk yield and milk composition. J. Dairy Sci., 78: 1073.

Hull, K. L. and S. Harvey (2001). Growth hormone: roles in female reproduction. J. Endocrinol., 168:1–23.

Kirby, C. J. ; S. J. Wilson and M. C. Lucy (1997). Response of dairy cows treated with bovine somatotropin to a luteolytic dose of prostaglandin F2*α*. J. Dairy Sci. 80:286.

Knight, C. H. (1992). Milk yield responses to sequantial treatments with recombinant bovine somatotropin and frequent milking in lactating goats. J. Dairy Sci. 59:115.

Ling, E. R. (1963). A Text Book Of Dairy Chemistry. 3rd ed.,Vol.2. Chapman and Hall, London, UK.

Mcdowell, G. H. ; H. D. Leenanuruksa ; P. Nimsup ; J. M. Gooden ; C. J. Vander Walt and R. Smithard (1988). Short- term effects of exogenouse growth hormone: Effects on milk yield and compositions, plasma hormones and metabolites. Aust. J. Boil. Sci. 11:279.

McDowell, G. H. ; I. C. Hart and A. C. Kirby (1987). Local intraarterial infusion of growth hormone into the mammary glands of sheep and goats: effects on milk yield and composition, plasma hormones and metabolites. Aust. J. Biol. Sci. 40: 181.

Miller, W. L. and N. L. Eberhardt (1983). Structure and evolution of the growth hormone family. Endocrine Rev. 4:97.

Morales-Roura, J. S. ; L. Zarco ; J. Hernandez-Ceron and G. Rodriguez (2001). Effect of short-term treatment with bovine somatotropin at estrus on conception rate and luteal function of repeat breeding dairy cows. Theriogenology 55:1831.

Moreira, F., C. A. Risco, M. F. A. Pires, J. D. Ambrose, M. Drost, and W. W. Thatcher (2000). Use of bovine somatotropin in lactating dairy cows receiving timed artificial insemination. J. Dairy Sci. 83:1237–1247.

Moreira, F., C. Orlando, C. A. Risco, R. Mattos, F. Lopes, and W. W. Thatcher (2001). Effects of presynchronization and bovine somatotropin on pregnancy rates to a timed artificial insemination protocol in lactating dairy cows. J. Dairy Sci. 84:1646–1659.

NRC (1985). Nutrient Requirements of sheep. Natl. Acad. Press, Washington, DC.

Ocampo, L. C. ; M. Morales ; H. C. Basurto and A. A. Auro (1995). Effect of somatotropin on milk production of cross-bred dairy cows in the tropics. Vet. Mexico 26: 137.

Prosser, C. G. ; I. R. Fleet ; A. N. Crops ; E. R. Froesch and R. B. Heap (1990). Increase in milk secretion and mammary blood Flow by intro the mammary glanf of the goat J . Endocrinol . 126:437.

Putuam, D. E. ; G. A. Varga and H. M. Dann (1999). Metabolic and production responses to dietary protein and exogenous Somatotropin in late gestation in dairy cows. J. Dairy. Sci., 82(5):982.

Rajamahendran, R. ; S. Desbottes ; J. A. Shelford ; R. G. Peterson and J. J. Kennelly (1989). Effect of recombinant bovine somatotrpin (rbST) on milk production and reproduction performance of dairy cows. J. Dairy Sci.72:444.

Roginski, H. ; J. W. Fuquay and P. F. Fox (2003). Encyclopedia of dairy sciences. Academic press, an imprint of Elsevier Science, 525 B Street, Suite 1900, San Diego, California, 92101-4495, USA. http//www.acadimicpress.com.

Sandles, L. D. ; Y. X. Sun ; A.G.C. D'Cruz ; G. H. McDowell and J. M. Gooden (1988). Responses of lactating ewes to exogenous growth hormone: short and long-term effects on productivity and tissue utilization of key metabolites. Aust. J. Biol. Sci. 41: 357.

Snedecor, G.W., and W.G. Cochran (1982). Statistical methods. Seventh Edition. Iowa State University Press, Ames, IA.

Stelwagen , K . ; D . G . Grieve ; J . S . Walton ; J . L . Ball and B . W . McBride (1993). Effect of pre-partum bovine Somatotropin in primisravid ewes on mammogenesis, milk production and J hormone concentration. J. Dairy. Sci. 76:992.

Tonner, E. ; G. Allan ; L. Shkreta ; J. Webster ; C. B. A. Whitelaw and D. J. Flint (2000). Insulin growth factor binding protein-5 (IGFBP-5) potentially regulates programmed cell death and plasminogen activation in the mammary gland. Pages 45–55 in Advances in Experimental Medicine and Biology, Vol. 480, Biology of theMammary Gland, Jan A. Mol and Roger A. Clegg, ed. Kluwer Academic/Plenum Publishers, London, UK.

Weller , R. F. ; R. H. Phipps ; N. Craven and C. J. Peel (1990). Use of a prolonged–release bovine somatotropin for milk production in British Friesian dairy cows. J. Agric. Sci. 115: 105.

Westbrook, S. L., K. D. Chandler, and *G.* H. McDowell (1993). Immunization of pregnant ewes against somatompin release inhibiting factor increases growth of twin lambs. Aust. J. Agric. Res. 44:229.

تأثير المعاملة بهرمون النمو المخلق حيوياً على الأداء الإنتاجى والتناسلى للنعاج

عبد الخالق السيد عبد الخالق* ، طارق عشماوى محمود عشماوى ** و هبه عبد العليم أبو الوفا**

*** قسم انتاج الحيوان ، كلية الزراعة ، جامعة المنصورة**

**** معهد بحوث الانتاج الحيوانى ، مركز البحوث الزراعية**

أجرى هذا البحث بمحطة بحوث الإنتاج الحيوانى التابعة لمعهد بحوث الإنتاج الحيوانى ، مركز البحوث الزراعية ، وزارة الزراعة ويهدف إلى دراسة تأثير المعاملة بهرمون النمو المخلق حيوياً أثناء مرحلة ما قبل وبعد الولادة على وزن الجسم ، إنتاج اللبن ومكوناته ومعدل الولادات فى النعاج خليط 2/1 فنلندى × 2/1 رحمانى .

استخدم 40 نعجة خليط (2/1 فنلندى × 2/1 رحمانى) عمرها من 3-4 سنوات قسمت إلى مجموعتين متماثلتين (مقارنة ومعاملة) تبعا لوزنها الحى . النعاج فى المجموعة الأولى استخدمت كمجموعة ضابطة بدون أى معاملة بينما النعاج فى المجموعة الثانية تم معاملتها بالحقن بـ 160 مجم بهرمون النمو المخلق حيوياً تحت الجلد كل 14 يوم خلال الشهر الأخير من الحمل ولمدة 4 اشهر بعد الولادة . تم كشف الشبق خلال موسم تناسل مايو فى النعاج وتلك التى أظهرت مظاهر شبق تم تلقيحها طبيعيا باستخدام 4 ذكور ناضجة ، وتم تقدير إنتاج اللبن ومكوناته لمدة 8 أسابيع بعد الولادة.

أوضحت النتائج أن وزن الجسم الحى للنعاج فى مرحلتى ما قبل الولادة وبعد الولادة مباشرة (خلال فترة الرضاعة) لم تتأثر بمعاملة بهرمون النمو المخلق حيوياً. بينما أظهرت النعاج المعاملة زيادة فى الوزن بحوالى 5% عن تلك التى لم تعامل خلال فترة ما بعد الولادة (خلال موسم التناسل ابريل – يونيو). زاد متوسط إنتاج اللبن اليومى نتيجة المعاملة بالـ rbST خلال 8 أسابيع من الولادة وكانت الزيادة حوالى 16-33% خلال أسابيع الرضاعة. تناقصت نسبة محتوى اللبن من الدهن والبروتين وبالتالى الجوامد الصلبة نتيجة المعاملة بهرمون النمو المخلق حيوياً خلال أول شهرين بعد الولادة ، بينما لم تتأثر نسبة اللاكتوز والرماد فى اللبن معنويا نتيجة المعاملة. زاد معدل ظهور الشبق / التلقيح (40 مقارنة بـ 70%) نتيجة المعاملة ب بهرمون النمو المخلق حيوياً حيث قلت فترة ظهور أول شبق بعد الولادة بحوالى 28 شهر مقارنة بالمجموعة المقارنة (65 مقارنة بـ 93 يوم). كانت نسبة حدوث الولادات (محسوبة للنعاج الملقحة) منخفضا معنويا فى النعاج المقارنة عن المعاملة (75 مقارنة بـ 85.7%).

الخلاصة أوضحت النتائج أن المعاملة بـ 160 مجم بهرمون النمو المخلق حيوياً كل 14 يوم بداية من الشهر الأخير من الحمل للنعاج ولمدة 4 اشهر بعد الولادة تؤدى إلى تحسين إنتاج اللبن ومعدل ولادات النعاج خليط 2/1الفنلندى × 2/1رحمانى.