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EFFECT OF CALCIUM SOAPS OF FATTY ACIDS AND RECOMBINANT BOVINE SOMATOTROPIN ON PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF BALADI GOATS DURING EARLY LACTATION

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SUMMARY

This study examined the mechanism by which calcium soaps of long chain of fatty acids (CSFA) and recombinant bovine Somatotropin (rbST) affect production and reproduction of Baladi goats (does). The present study was carried out on 16 multiparous pregnant Baladi does aged 2.5 - 3 years. The treatments were initiated approximately four weeks before lambing until eight weeks post-lambing. Animals received 1 kg /head/day basal diet and allocated into four groups (n = 4does /group): without any treatment (control group I), plus 50 gm/head/day of CSFA (group II), 1 mg /kg body weight of rbST S/C injection every 14 days (group III), or a combination of CSFA supplementation and rbST injection (group IV). It was found that a significantly shorter mean intervals (days) from lambing to first luteal activity and to conception and a higher percentage of ovarian cyclicity (100%) in group II and IV than in group I and III (75%). Conception rate was also higher in group II and IV (100%) than group III (75%) and I (50%). All kids of the treated groups had a significantly increase in their birth and weaning weights when compared with those from control group. There were significant increases in serum insulin in group II and IV and in serum leptin in all treated groups throughout the trial. Prolactin concentration was significantly higher in all treated groups than in the control one especially in rbST injected does. Also serum progesterone level showed a significant increase in all treated groups. Meanwhile, there was a significant effect of CSFA and rbST on T3 level during the first two weeks only of post-partum period and on T4 at day of lambing and during the second month of post-partum period. There was a significant increase in milk

fat in all treated groups than control one, but showed highly significant increase in groups II and IV than in group III. Meanwhile, there was a non-significant effect of treatments on percentage of milk protein, total solids or solid not fat throughout the trial. In addition, there was a significant decrease in milk urea content in the three treated groups than in the control group. In conclusion, using of CSFA and rbST have a positive effect on lamb performance and milk composition. Meanwhile, CSFA supplementation has a more positive effect on reproductive performance, lamb performance and milk composition than injection of rbST. So, we recommend that using CSFA for does during late pregnancy and early post-partum period as a feed supplement at a level of 50 gm/head/day to improve reproductive performance, enhance metabolic profile, enhance lamb performance (in terms of birth weight, weaning weight and growth rate) and improve milk quantity and quality.

INTRODUCTION

Inadequate dietary energy intake and poor body condition can negatively affect reproductive function (Funston, 2004). Patton et al. (2007) reported that, increasing severity of negative energy balance (NEB) in early lactation is associated with impaired ovarian function (delay resumption of estrus, silent heat and ovulatory defect) and conception failure at 1st postpartum estrus. During this period, dams fail to consume enough feed to meet the increasing nutritional demand and they must mobilize body reserve to meet the deficiency (Moallem et al., 1997). Major increase in milk yield is often associated with reduced reproductive performance (Cole et al., 1992). Moallem et al.(2007) revealed that, the use of rbST in dairy ruminants make major increase in milk production but this increase led to loss in body condition score of treated animals and post-partum reduction in the ability of ovarian follicles to produce estradiol. These changes might have a considerable effect on the fertility of rbST treated dams. There are few studies discussing the effect of rbST on such reproductive phenomenon. Fat supplementation in the diet of dairy cows in early lactation enhances the energy density of the ration and can increase energy intake of animals (Moallem et al., 1997). Dietary supplementation of fat can improve reproductive function of ruminants (Bilbey et al., 2006). Hegazy and El-Ekhnawy (2002) found that, the conception rate increased in Barki ewes supplemented with CSFA (86.7%) than control one (60%). Also, Howida (2004) recorded that, CSFA could be safely used as a feed supplement during late gestation and early lactation resulted in an improved post-partum reproductive performance of treated buffaloes and enhanced metabolic profile and calf performance. In Europe, the propularity of dairy products from goat milk increased during the last 30 years because of their nutritional values and a more favorable perception than dairy products from cow

milk. Quality of goat milk cheese is influenced by milk fat and protein contents (Brown et al., 1995). However, farmers face problems of low fat content (Morand-Fehr et al., 2000) and the goaty off-flavor in goat milk which is attributed to the medium chain C6, C8 and C10 fatty acids (Astrup et al., 1985). Teh et al. (1994) hypothesized that the dietary calcium soap of long chain fatty acids has the ability to increase fat content and to reduce the concentration of medium chain fatty acids in goat milk, hence improving the taste of goat milk and increase its acceptability.

Because the little detailed information to evaluate the effect of rbST and fat supplementation on goats during late pregnancy and early postpartum period on reproductive performance, hormonal profile as well as milk composition, therefore, the main objective of the present study was to examine the separate and combined mechanisms by which rbST and CSFA administration affect reproductive performance, offspring weights, some hormonal and milk composition in Baladi goats.

MATERIALS AND METHODS

The current experiment was conducted during the period from December, 2005 to June, 2006 on the experimental farm of the Animal Reproduction Institute (ARRI) EL-Ahram, Giza.

Animal management and diets:

The experiment was carried out on 16 multiparous pregnant does 2.5 - 3 years and weighing 27-34 kg allocated into four groups (4 does in each group). They were randomly divided according to age, parity, body weight and according to their treatment. The treatments were initiated approximately four weeks before lambing until eight weeks post-lambing. Does within each treatment were housed in similar pens equipped with feeder and water supply under natural daylight and temperature. All does were fed on basal diet according to Animal Reproduction Research Institute (ARRI) management, consisted of 25% cotton seed cakes, 3% soya bean meal, 55% wheat bran, 9% yellow corn, 5% rice bran, 2% lime stone and 1% common salts. This concentrates mixture contained 14% crude protein and 11% crude fiber. In addition green clover, water was offered ad libitum. Group I (control group): does were fed basal diet, and received no treatment. Group II (CSFA group): does were fed basal diet plus 50 gm/head/day CSFA [Magnabac: Calcium soaps of palm oil fatty acids; Norel.Spain]. Group III (rbST, group) does were fed basal diet plus administration of subcutaneous (S/C) injection of 1mg/kg body

weight of rbST [recombinant bovine somatotropin=Somatech Elancofs Animal health-Elilly-export S.A.Po.Box 580, 1214 verni, Gener, switzland] each two weeks according to Lefebvre and Block (1992). Does in group IV (CSFA + rbST group) were treated as does in group II and III.

Estrus detection and Pregnancy diagnosis:

Does of the four groups were exposed to a fertile bucks (for estrus detection) twice daily for 45 days beginning from day 15 post-lambing. Once does came in estrus (first detected estrus) were bred by fertile bucks. Pregnancy was diagnosed by ultrasound scanner (200 pie Medica co. - Netherlands, Holland) about one month post-mating.

Lamb Performance:

Borned lambs were weighed at the day of birth (Birth Weight, BW) and then on day 60 of age (Weaning Weight, W W).

Blood sampling:

Ten ml of blood was collected from the jugular vein before feeding and allowed to coagulate and serum harvested stored and frozen at - 20°C for hormonal analyses. At day of birth and there after every two weeks till two months for analyses of insulin, T3 and T4 and till one month for prolactin assay. Meanwhile, blood samples for leptin analyses were taken at days 15, 30, 45 and 60 post-lambing. For progesterone assay, blood samples were allocated from all does twice a week, starting from 15 days post-lambing and for 45 days later, to detect ovarian activity (1st luteal activity and to confirm first detected estrus) and pregnancy.

Hormonal assay:

Serum samples were analyzed by ELISA technique (DRG Instruments GnbH, Germany. Division of DKG - international Inc. Fravenberg Str.18, D. 325039 Marburg). DRG enzyme Immunoassay kit is a solid phase enzyme linked immunosorbent assay (ELISA) based on sandwich principle. Insulin was analyzed according to Judzewitsch et al. (1982), prolactin according to Uotila et al. (1981), and Leptin according to Considin and Sinha (1996). T_3, T_4 and progesteron were analyzed by ELISA, it is a solid phase base on the principle of competitive binding. Thes hormones were analyzed according to Walke (1977), Wistom (1976) and Katt et al. (1985) respectively. The absorbance of each well was determined at 450 ± 10nm with a micro titer plat reader. Calculate the average absorbance value for each set of standards, control and unknow samples. Construct a standard curve by plotting the mean absorbance obtained from each standard against its concentration with absorbance value on the vertical (Y) axis and concentration on the horizontal (X) axis. The concentration was determined from the standard curve by using the mean absorbance value for each sample.

Milk sampling:

Milk samples were taken every two weeks until 60 days post-partum. Milk samples were analyzed using infrared milk analyzer (Bentley - 150). To estimate fat % , protein %, lactose %, urea mg %, total solid (TS) % , solid not fat % (SNF).

Statistical analysis:

All data were subjected to statistical analysis according to Snedecor and Cochran (1982). Data were analyzed by one way ANOVA implying a randomized complete block design after angular (Log) 1989. The difference between treatments were further compared by Duncan multiple range test using 3.03 version of Costat [Eco - Soft Inc ñ USA) computer program.

RESULTS AND DISCUSSION

Reproductive performance:

Table (1) showed the effect of CSFA and rbST on some post-lambing reproductive parameters as follow: The mean interval (days) from lambing to first luteal activity (days to first post-lambing increase in serum progesterone level ≥ 1ng/ml) was significantly ($P<0.01$) shorter in CSFA and CSFA + rbST group than in rbST group and control one. Concerning ovarian cyclicity, CSFA and CSFA + rbST treatments caused an increase in the percentage of dose exhibiting estrous cycle (first detected estrus) during the 50 days post-partum. These results are in agreement with those reported by Hegazy et al. (1999) in Barki ewes, Stephan-Beam and Butler (1997) and Howida (2004) in cattle. These enhancements may be attributed to improvement of folliculogensis and/or enhancement of LH secretion. In respect to folliculogensis, by the day 21 post-partum, CSFA supplementation enhances the follicular development by increasing the number of medium sized follicles from which the preovulatory follicles was selected (Wehrman et al., 1991). Such improvement may be due to that fat supplementation stimulated androgen biosynthesis by theca interna (Falck et al., 1962), which in turn promoted follicular development (Tonetta and Dizerega, 1989). In the same time fat supplementation increases the growth, diameter and mature size of preovulatory dominant follicles (Robinson et al., 2002). Thus, CSFA provided the potential for enhancing the resumption of normal ovulatory cycle early post-partum (Lammoglia et al., 1997). Another possible explanation for such improvement is the increment of insulin level by fat supplementation (Thomas, 1994). Insulin influenced a number of ovarian cellular processes with an important role in post-partum return to ovarian competence (Francisco et al., 2003). Moreover, increased plasma insulin and insulin-like growth factor-1 (IGF-1) levels are known to influence population of medium sized follicles (Thomas and Williams, 1996). The protected fat supplementation increases the blood serum insulin (Thomas, 1994) and IGF-1 (Robinson et al., 2002) concentrations. So, it is possible that

hyperinsulinemia is one of the mechanisms through which this diet modifies ovarian follicular and/or luteal processes. On the other hand, the enhancement of LH secretion responsible for ovulation was reported by Hightshoe et al. (1991) who found higher basal level of LH during postpartum period in fat fed cows.

Higher conception rates were observed in CSFA-fed and CSFA+rbST treated does than rbST group and control one. Similar results were reported by Caja (1989) and Hegazy et al. (1999) in ewes fed lipid and Sklan et al. (1991) and Espinoza et al. (1995) in cows. Such improvement in conception rate may be attributed to the high circulating levels of progesterone during the luteal phase (Howida, 2004). An essential perquisite for the successful establishment of pregnancy is the maintenance of high progesterone secretion by fully functional corpus luteum (Parr, 1992). So dietary fat may increase pregnancy rate by reducing the number of subfunctional corpora lutea and increasing its life span in female cattle (Williams, 1989). Regarding the interval (days) from lambing to conception, which was significantly ($P<0.01$) decreased in CSFA and CSFA + rbST groups than in rbST group and control one. Similar results were reported by Espinoza et al. (1998) in ewes and Howida (2004) in cattle. Such effect could be explained as fat supplementation decreased the post-partum intervals to the first luteal activity, first detected estrus and decreased the number of services per conception (Sklan et al., 1991) and increased the rates of conception. On the other hand, the interval from lambing to conception (days) was longer in rbST treated does than CSFA and CSFA+rbST treated ones, such finding may be due to the increment in concentrations of serum prolactin and progesterone. This increment may delay conception as reported by Davidage et al.(1987) This elevation depress the expression of estrous behavior, making the detection of estrous more difficult, resulting in missed estrous and accounting for longer calving intervals and need more services per conception (Mc Guffey et al., 1991).

Table (1): the effect of CSFA, rbST and CSFA+rbST on some reproductive parameters:

	Days to first luteal activity	Ovarian cyclicity	Conception rate	Days to conception
• Control	38.25 ± 2.36^{a}	3/4 (75%)	2/4 (50%)	53.25 ± 2.52^{a}
• CSFA	27.00 ± 0.91^{b}	4/4 (100%)	4/4 (100%)	39.5 ± 2.32^{b}
• rbST	36.00 ± 1.82^{a}	3/4 (75%)	3/4 (75%)	49.00 ± 0.91^{a}
• CSFA+rbST	27.25 ± 1.42^{b}	4/4 (100%)	4/4 (100%)	40.00 ± 1.71^{b}

Means with different superscripts letters in the same column are significantly different at P<0.01 and 0.001

Lamb performance:

The obtained data in table (2) revealed that, there was a significantly increase (P<0.01) in lamb birth and weaning weights in lambs born from CSFA and CSFA+rbST treated dams as compared with those from control does. The pre-weaning growth rate (g/d) was significantly (P<0.01) faster in lambs came from treated groups than those from non-treated control one. Also, data in the same table revealed that male lambs were significantly (p <0.01) heavier at birth and weaning weights and had a faster (P<0.01) pre-weaning growth rate (g/d) than female lambs. Similar results were recorded by Caja (1989) and Hegazy et al. (1999) in sheep. It seems that, birth weight was the function of late pregnancy feeding and the metabolizable energy provided by CSFA during late gestation was sufficient to stimulate greater fetal growth. Robinson (1983) and Hafez (1987) noted that the gain mass of the fetus in the last 8, 4, 2 weeks of the gestation that was equivalent to 85, 50 and 25 % of the birth weight. The increment in weaning weight may be due to increase both milk production and fat % recorded in milk of treated dams than that milk of control group led to increase in average day gain (ADG). This finding has previously been reported by Bauattour et al. (2008) in goat and Espinoza et al. (1998) in ewes, Knapp and Grummer (1991) in dairy cows. Also there was a significantly increase (P<0.01) in lamb birth weight, weaning weight and ADG in that kids from rbST treated dams than that kids from control does. These results agreed with those obtained by Armstrong et al. (1995) in cattle and Hayat (2001) in ewes who reported that rbST administration increased milk yield led to increase in ADG and weaning weight in calves and lambs. Also Bauman et al. (1985) recorded that blood flow through the mammary gland increased during bST administration. This flow provides critical precursors for the synthesis of milk fat, protein and lactose in the mammary gland, increases the rate of milk synthesis per cell and stimulates the liver to produce more glucose and IGF1.

Table (2): Means ± SE of birth weight (BW), Weaning Weight (WW) and Average Daily Gains (ADG) of kids as affected by sex and treatment of their dams on CSFA, rbST and CSFA+ rbST during late pregnancy and suckling periods.

Main Effect	Birth Weight (kg)	Weaning Weight (kg)	Average Day Gain (g/d)
Treatment			
• Control	1.95 ± 0.07^{c}	13.87 ± 0.23^{c}	198.32 ± 3.23^{c}
• CSFA	2.38 ± 0.05^{a}	15.98 ± 0.16^{a}	227.21 ± 2.09^{a}
• rbST	2.12 ± 0.06^{ab}	14.77 ± 0.28^{b}	210.17 ± 3.92^{b}
• CSFA +rbST	$2.2\,0 \pm 0.06^{ab}$	15.89 ± 0.10^{a}	228.22 ± 1.06^{a}
Sex			
• Male	2.42 ± 0.03^{a}	16.11 ± 0.15^{a}	231 ± 2.10^{a}
• Female	1.98 ± 0.03^{b}	14.33 ± 0.28^{b}	205 ± 4.30^{b}

Means with different superscripts letters in the same column are Significantly different at P<0.01 and 0.001

c- Hormonal analysis:

Data analysis (Table, 3) revealed that, serum progesterone (P_4) level of treated groups was significantly (P<0.001) higher at the day of estrus, at the 5th day after ovulation, as well as at day 5 post-conception (P< 0.01) at days 15 and 30 post-conception (for conceived does) than that of the control one. Among treated groups, it is clear that, CSFA fed group had a serum progesterone level significantly higher at the day of estrus, 5th day after ovulation than that of the other treated groups and the control one. These results are in accordance with Mansour et al. (2000) in goats; Espinoza et al. (1997) in ewes. Meanwhile at days 5 and 30 post - conception, serum progesterone level was significantly higher in CSFA fed does than in rbST and control groups. These results supported the previous data reported by Carroll et al. (1990); Sklan et al. (1991) and Howida (2004) in cattle. The mechanism by which the dietary fat increases the serum progesterone level has not been well defined. The increase in serum concentration of lipids was associated with an increase in the intracellular lipid droplets within the small and large steroidogenic cell types that constitute the bovine corpus luteum. This increment would be expected to provide an increased precursor for p_4 biosynthesis (Hawkins et al., 1995). Grummer and Carroll (1988) reported that the increased concentration of serum progesterone was associated with increased serum lipid content. this may be due to alterations in rate of clearance of progesterone or cholesterol. The time required for disappearance of half of progesterone from serum after ovariectomy was higher in cows fed CSFA (Hawkins et al., 1995). Also, there was a

significant increase (P<0.01) in serum progesterone level in rbST treated and CSFA+ rbST treated groups than control one at day of estrus; 5th day after ovulation and day 30 post-conception. The increased levels continued with increasing number of injections during the period of the experiment. These findings agreed well with that obtained by Armstrong et al. (1995) who reported that, the direct effects of rbST on ovarian function are possible because somatotropin receptors mRNA has been localized in the ovary. In addition, administration of Somatotropin enhances follicular growth (De La Sota et al., 1993; Hayat, 2001 and EL Far et al., 2004) in ewes. Granner (1999) revealed that the injection of rbST increased weight of CL and plasma progesterone concentration by large luteal cells because somatotropin receptors were located in bovine CL and large luteal cells.

Data analysis in table (4) revealed that all CSFA-

Table (3): Means ± SE of serum progesterone (ng/ml) concentration of control, CSFA, rbST and CSFA+ rbST treated groups.

Treated groups	For all does		For conceived does		
	(0) day of estrus	5th day after ovulation	5th days after conception	15 days after conception	30 days after conception
• Control	0.02 ±0.0005^{c}	3.88 ± 0.23^{c}	8.00 ± 0.58^{c}	11.84 ± 0.41^{c}	19.25 ± 0.68^{c}
• CSFA	0.03 ± 0.0005^{a}	7.42 ± 0.46^{a}	15.17 ± 1.15^{a}	15.02 ± 1.47^{ab}	27.50 ± 1.40^{a}
• rbST	0.02 ± 0.001^{b}	5.46 ± 0.37^{b}	11.84 ± 0.53^{bc}	12.65 ± 0.85^{bc}	23.19 ± 0.31^{b}
• CSFA+rbST	0.02 ± 0.001^{b}	6.24 ± 0.41^{b}	13.58 ± 0.82^{ab}	16.86 ± 0.96^{a}	25.51 ± 1.71^{ab}

Means with different superscripts letters in the same column are significantly different at P<0.01 and 0.001.

fed and CSFA+ rbST treated groups had a highly significant (P<0.01) increase in serum insulin level throughout the trials as compared with the control one. These results are in agreement with previous results reported by Mansour et al. (2000) in goat, Hegazy and El Ekhnawy (2002) in sheep and Thomas (1994); Lammoglia et al. (1997) and Howida (2004) in cattle, who recorded that the increment dietary fat can modify the secretion pattern of insulin, which may be related to an increase in propionate production and gluconeogenesis. As diets containing high amount of long chain fatty acids increase hepatic gluconeogenesis due to the increase in propionate production in the rumen (Chalupa et al., 1986 and Keel et al., 1989). On the other hand, there was a non significant increase in serum insulin level in rbST treated does than control during birth day, 2w, and 4w and 6w post-partum but it showed significant increase (P<0.01) during 8weeks. These results agreed with Chung et al. (1985) and Eisemann et al. (1986) who found that plasma insulin levels were chronically elevated in rbST injected cows. William and Ganong (1989) reported that rbST does not stimulate B-cells of the pancreas directly; it increases the ability of pancreas to respond to insulinogenesis stimuli.

Table (4): Means ± SE of serum Insulin, Triiodothironin (T_3) and Thyroxin (T_4) concentrations of CSFA, rbST and CSFA+ rbST treated does.

	Birth day	2weeks PP	4weeks PP	6weeks PP	8weeks PP
Insulin µU/ml					
Control	12.39 ± 0.95^{c}	15.74 ± 1.15^{c}	15.09 ± 0.64^{c}	19.28 ± 0.81^{c}	17.66 ± 0.55^{c}
CSFA	28.97 ± 3.03^{a}	21.78 ± 1.46^{a}	27.17 ± 2.24^{b}	41.41 ± 2.67^{a}	39.55 ± 2.70^{a}
rbST	16.87 ± 1.06^{bc}	18.05 ± 0.60^{bc}	17.94 ± 0.71^{bc}	22.76 ± 0.83^{bc}	29.00 ± 2.86^{b}
CSFA+rbST	23.35 ± 1.78^{ab}	22.94 ± 1.56^{ab}	21.54 ± 1.43^{a}	35.37 ± 2.29^{b}	43.89 ± 4.31^{a}
T_3(ng/ml)					
Control	1.40 ± 0.01^{a}	1.38 ± 0.03^{a}	1.24 ± 0.01	1.29 ± 0.03	1.27 ± 0.01
CSFA	1.16 ± 0.02^{b}	1.11 ± 0.08^{b}	1.11 ± 0.10	1.28 ± 0.10	1.19 ± 0.15
rbST	1.19 ± 0.01^{b}	1.19 ± 0.05^{b}	1.19 ± 0.03	1.20 ± 0.05	1.16 ± 0.07
CSFA+rbST	1.14 ± 0.02^{b}	1.13 ± 0.02^{b}	1.16 ± 0.05	1.19 ± 0.02	1.08 ± 0.05
T4 (ug/dl)					
Control	9.48 ± 0.51^{a}	10.46 ± 0.79	10.47 ± 0.42	11.39 ± 0.59^{a}	12.61 ± 1.10^{a}
CSFA	7.16 ± 0.42^{c}	9.06 ± 0.67	8.66 ± 0.99	9.80 ± 0.37^{b}	10.13 ± 0.14^{b}
rbST	8.73 ± 0.34^{ab}	8.82 ± 0.53	9.32 ± 0.55	10.08 ± 0.24^{b}	9.17 ± 0.71^{b}
CSFA+rbST	7.70 ± 0.53^{bc}	9.04 ± 0.38	9.12 ± 0.40	9.45 ± 0.47^{c}	10.03 ± 0.46^{b}

Means with different superscripts letters in the same column are significantly different at P<0.05 in T3 and T4 and at P<0.01; P<0.001 in insulin.

The data in the same table showed that there was a little effect of CSFA and rbST on serum Triiodothironin (T_3) level. There was a significant (P<0.05) decrease in serum T_3 level in all treated groups than in the control one from day of lambing till two weeks post-lambing, after that the decrease in the same groups was non-significant till 8 weeks post-lambing as compared with the control one. Regarding serum Thyroxin (T_4) level, there was a significant (P<0.05) decrease in its level observed among treated groups at day of lambing than that of the control one, then this decrease was non-significant till four weeks post-lambing. Later at weeks 6 and 8, serum T_4 levels significantly (P<0.05) decreased again in all treated groups than the control one.

There was a significant (P<0.05) increase in serum leptin level as shown in table (5) in CSFA, rbST and CSFA + rbST treated does at week 2 post-lambing and was highly significant (P<0.001) elevated in the same groups at weeks 4 and 6 post-lambing, meanwhile at week 8 there was no difference between control and treated groups in serum leptin concentration. Leptin is a link between metabolic status and the activity of neuroendcrine system that control reproductive status (Kadokawa, 2000).In lactating dairy cows, the onset of net negative energy balance and par-

parturition causes a reduction in plasma leptin and insulin (Block et al., 2003), and also indicates that positive energy balance and hyperinsulinemia in lactating cows is associated with a significant increase in plasma leptin, which is in agreement with our results. Also Spicer et al. (2000) reported that elevated concentration of plasma leptin can increase the insulin-induced proliferation of thecal cells and inhibit steroidogenesis. Thus, it seems likely that leptin and IGF-I interact in controling the resumption of ovulation in post-partum dairy cows (Kadokawa et al., 2006).

Table (5) :Means ± SE of serum leptin (ng/ml) concentrations of CSFA, rbST and CSFA+ rbST treated does.

Treatment	2weeks pp	4weeks pp	6weeks pp	8weeks pp
• Control	1.65 ± 0.13^{b}	1.32 ± 0.14^{b}	1.48 ± 0.16^{b}	2.05 ± 0.02^{a}
• CSFA	1.99 ± 0.07^{a}	1.95 ± 0.03^{a}	1.96 ± 0.04^{a}	1.98 ± 0.06^{a}
• rbST	1.92 ± 0.03^{a}	1.90 ± 0.05^{a}	1.94 ± 0.05^{a}	1.93 ± 0.10^{a}
• CSFA+rbST	1.93 ± 0.05^{a}	1.95 ± 0.03^{a}	1.94 ± 0.04^{a}	2.05 ± 0.08^{a}

Means with different alphabetical letters in the same column are significantly different at P<0.05; 0.01 and 0.001.

The effect of rbST treatment on serum prolactin level was clear as shown in table (6). It was found that serum prolactin level was markedly (P<0.001) elevated in rbST treated group than in the other groups throughout the trial (from lambing day till one month post-lambing).These results agreed with the findings of Armstrong et al. (1995) who reported that exogenous rbST led to increase in the concentration of plasma prolactin in lactating cows which resulted in an increase in milk yield. On the same line, the obtained data also revealed that prolactin level was significantly (P<0.05) increased in CSFA and CSFA + rbST treated groups at day of lambing and till 4 weeks post-lambing than those of the control one. This elevation in serum prolactin levels in all treated groups may be attributed to the decreased serum T3 and T4 levels in the same groups during the first four weeks post-lambing as subnormal serum levels of T3 and T4 increase TRH-induced prolactin release (Snyder et al., 1973).

Table (6): Means ± SE of serum prolactin (ng/ml) concentrations of CSFA, rbST and CSFA± rbST treated does.

Treatment	Birth day	2weeks pp	4weeks pp
• Control	2.83 ± 0.06^{c}	4.43 ± 0.30^{b}	4.01 ± 0.15^{d}
• CSFA	5.56 ± 0.44^{b}	4.83 ± 0.67^{b}	5.10 ± 0.13^{c}
• rbST	8.87 ± 0.09^{a}	7.62 ± 0.15^{a}	7.98 ± 0.17^{a}
• CSFA+rbST	4.89 ± 0.31^{b}	5.83 ± 0.40^{b}	6.36 ± 0.57^{b}

Means with different alphabetical letters in the same column are significantly different at P<0.01and 0.05

Milk composition:

The results of milk samples analysis are shown in table (7). It was showen that, milk from all treated groups had a highly significant (P<0.001) increase in fat percentage. Concerning the increase milk fat percentage due to CSFA feeding, these results confirm previous observation by Teh et al. (1994); Senz Sampelyo et al. (2004) and Bouattour et al. (2008) in does; Espinoza et al. (1998) in ewes and Schauff et al. (1992) in dairy cows, which may be attributed to an increase in the exogenous supply of fatty acids due to CSFA feeding which were incorporated directly into milk Schauff et al. (1992). In the same line, milk fat percentage was increased by rbST injection than control. This similar to results of Disenhaus et al. (1995) in does and Hemken et al. (1991) in cows. Bauman et al. (1988) and Carriquiry et al. (2008) recorded that lipogenesis in body tissues is reduced due to S/C injection of rbST to lactating cows. This allows more free fatty acids which are oxidized as energy source by most tissues used directly in production of milk fat in mammary gland. The increased loss of energy the milk production was compensated by mobilization of fat reserves, which reducing body weight. Also, Peel and Bauman (1987) recorded that milk fat content increased in response rbST administration only when cows were placed on a negative energy balance.

Concerning milk lactose content which was non-significantly decreased in CSFA-fed and CSFA+rbST treated does than the control one which was in agreement with Rotunno et al. (1998) in ewes, this moderate decrease in milk lactose content exhibited by CSFA-fed groups might be partly ascribed to the smaller amount dietary starch received by this supplemented groups (Succi and Sandrucci, 1995). On the other hand, our results showed a significant (P<0.01) decrease in milk lactose content due to rbST treatment as reported by Soderholm et al. (1985)

Table (7): Means ± SE of milk fat, protein, lactose, urea, total solids and SNF of CSFA, rbST and CSFA+ rbST treated does.

	Control	CSFA	rbST	CSFA + rbST
• Fat (%)	3.12 ± 0.05^{c}	5.61 ± 0.22^{a}	4.20 ± 0.14^{b}	5.26 ± 0.20^{a}
• Protein (%)	2.71 ± 0.17	2.74 ± 0.12	2.60 ± 1.30	2.66 ± 1.33
• Lactose (%)	4.46 ± 0.03^{a}	4.39 ± 0.02^{ab}	3.95 ± 0.03^{c}	4.29 ± 0.90^{b}
• Urea (mg %)	24.14 ± 0.95^{a}	19.06 ± 1.03^{b}	20.27 ± 1.49^{ab}	18.39 ± 0.76^{b}
• Total Solid (%)	12.76 ± 0.23	13.36 ± 0.47	11.90 ± 0.37	12.68 ± 0.37
• Solid Not Fat (%)	8.35 ± 0.27	8.28 ± 0.17	7.18 ± 0.34	6.19 ± 1.68

Means with different alphabetical letters in the same raw are significantly different at P< 0.001 in fat and urea and at P< 0.05 in lactose.

Concerning milk urea content, it was found that, milk from CSFA-fed and CSFA+ rbST treated groups had a significantly (P< 0.05) reduced urea content than that from control one, this could be explained as CSFA efficaciously protects ruminal microbes from the adverse effect of fats (Chalupa et al., 1986), and due to the energy-yielding activity of CSFA which facilitates capturing of ammonia by rumen microbial population and optimizes microbial protein synthesis that resulted in decreased serum urea concentration (Khaled et al., 2005) and consequently decreased milk urea content. Meanwhile, there was a non-significant decrease in milk urea content in rbST treated does, this agreed with Disenhaus et al. (1995) who recorded that, urea concentration in plasma diminished by bST treatment. The ability of bST to spare amino acids from catabolism and consequently to decrease urinary excretion of nitrogen was demonstrated (Sechen et al., 1989). Evidence for increased use of amino acids for protein synthesis has been reported by Bauman et al. (1988).

Data analysis showed a non-significant effect in the percentage of milk protein, total solids and solid not fat due to neither CSFA feeding nor rbST treatment among the treated groups and the control one. Regarding to CSFA feeding and milk protein, this was in agreement with other reports (Teh et al., 1994) in does, and solid not fat which was in agreement with (Schauff et al., 1992) in dairy cows. Also, protein content of milk generally is not affected by rbST as reported by Hemken et al. (1991).

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تأثير صابونيات الأحماض الدهنية للكالسيوم و السوماتوتروبين المصنع بالهندسة الوراثية على الكفائة التناسلية والإنتاجية للماعز البلدي أثناء فترة ما بعد الولاده .

هويدا محمد أحمد عبد الرحمن ، حياة حسن محمد النور ،
صفاء أبو العينين الوكيل ، أيمن حسن على
معهد بحوث التناسليات الحيوانية بالهرم

استهدفت هذه الدراسه تأثير إضافة صابونيات الأحماض الدهنية للكالسيوم لعلائق إناث الماعز و حقن السوماتوتروبين على الكفائه التناسلية والإنتاجية والتقديرات البيوكميائية في الدم في فترة ما بعد الولاده . تحتاج الإناث فى بداية الرضاعة إلى قدر كبير من الطاقة لإنتاج اللبن و عندما لا تعوض بالطاقة اللازمة لها فإنها تتعرض لمشاكل كثيرة تؤثر سلبيا على كفائتها التناسلية والإنتاجية بعد ذلك ، لذلك لجانا لإستخدام كلا من صابونيات الأحماض الدهنية للكالسيوم و السوماتوتروبين لتلافى تلك السلبيات .

اجريت هذه الدراسة على عدد ١٦ انثى ماعز متعددة الولادات و تبلغ من العمر ٢،٥ الى ٣ سنوات و قد بدأت المعالجة قبل الولادة بأربعة أسابيع و لمدة ثمانية أسابيع بعدها . قد تم تغذية كل حيوانات التجربة على كيلو جرام واحد من العليقة المتزنة يوميا وقد تم تقسيم تلك الحيوانات الى أربع مجموعات متساوية (تحوى كل منها أربع إناث من الماعز)، المجموعة الأولى : لم تتلقى أية معالجات واعتبرت كمجموعة ضابطة ، المجموعة الثانية : أضيف لها ٥٠ جرام للرأس فى اليوم من صابونيات الأحماض الدهنية للكالسيوم ، المجموعة الثالثة : حقنت تحت الجلد بـ ١ مجم / كجم من وزن الجسم بهرمون السوماتوتروبين كل أسبوعين والمجموعة الرابعة : عولجت بكل من صابونيات الأحماض الدهنية للكالسيوم و السوماتوتروبين بنفس الجرعات فى المجموعتين السابقتين . وقد وجد ان إضافة صابونيات الأحماض الدهنية للكالسيوم أدى الى إنخفاض معنوي في الفترة من الولادة حتى ظهور أول جسم أصفر-

و حتى حدوث العشر في كل من المجموعتين الثانية والرابعة و قد وجد أيضا أن إضافة الدهون إلى عليقة تلك الإناث قد أدى إلى زيادة ملحوظة في نسبة الإناث الشائعة (عن طريق ملاحظة هرمون البروجيستيرون في الدم خلال ٥٠ يوم بعد الولادة) و إلى زيادة معنوية في نسبة الإناث العشار في نفس المجموعتين الثانية والرابعة عنها في مجموعة السوماتوتروبين و المجموعة الضابطة . كما أشارت النتائج إلى أن حقن السوماتوتروبين للامهات أو إضافة صابونيات الأحماض الدهنية للكالسيوم لعلائقهم أدى الى زياده فى أوزان الحملان عند الولاده وعند الفطام بالإضافه إلى زياده ملحوظه فى معدل نمو تلك الحملان . وفي نفس الوقت اثبتت النتائج ان تركيز كل من هرموني الانسولين و اللبتين ارتفع معنويا في كل المجموعات المعالجه فى كل فترات التجربة وكذلك ابدى هرمون البرولاكتين زياده معنويه فى جميع المجموعات المعالجه في التجربة و خاصة تلك المعالجة بالسوماتوتروبين . وقد اظهر هرمون البروجيستيرون زياده معنويه اثناء التجربة فى الماعز المعالجة مقارنة بالمجموعة الضابطة . و أوضحت النتائج ان المعالجات السابقة قد اثرت تأثيرا سلبيا على هرمونات الغده الدرقيه حيث وجد أن مستوى هرمون الترياَيودوثيرونين (T) قد انخفض انخفاضا معنويا فى المجموعات المعالجه فى أول اسبوعين بعد الولاده عنه فى المجموعه الظابطه . بينما انخفض مستوى هرمون الثيروكسين (T) انخفاضا معنويا في المجموعات المعالجه فى يوم الولاده ثم عاد لينخفض مره أخرى أثناء الشهر الثانى بعد الولاده عنه في المجموعة الضابطة . واظهرت الدراسة زيادة نسبة الدهون فى لبن الإناث المعالجة و خاصة فى الجموعة الثانية و الرابعة . و كانت نسبة تركيز اليوريا فى اللبن قليلة معنويا فى الماعز المعالجة عن المجموعة الضابطة .

و نستخلص من هذه النتائج ان استخدام كلا من صابونيات الأحماض الدهنية للكالسيوم و السوماتوتروبين قد أدى تاثير ايجابية على الماعز فى تلك الفترة الحرجة من ناحية الكفاءة التناسلية و كفاءة المواليد .

و كذلك زيادة إنتاج و تحسين مكونات اللبن و كان استخدام صابونيات الأحماض الدهنية للكالسيوم أكثرهم إيجابية لذلك ننصح باستخدامه اثناء المرحلة الاخيرة من الحمل و بداية الرضاعة كإضافات لأعلاف إناث الماعز البلدى عند مستوى ٥٠جم/رأس/يوم لتحسين الكفائه التناسليه وتحسين أوزان الحملان عند الولاده وعند الفطام وكذلك لزيادة إنتاج وتحسين مكونات اللبن .