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EFFECT OF SYNCHRONIZATION PROTOCOLS ON HAEMATOLOGICAL AND BIOCHEMICALPARAMETERS IN HEJAZI GOATS

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ABSTRACT

Background: The objective of this study was to evaluate changes of haematological and biochemical parameters in Hejazi goats under synchronization protocols treatment. **Methods:** Forty fertile and healthy female Hejazi goats were divided equally and randomly into four groups (n=10). All synchronization protocols started 7 days after the first 125 µg Cloprostenol injection (i.m.). The first group received CIDR treatment for 7 days only and followed by injection of second dose of PGF2α and 400 IU of PMSG, and the second group received CIDR treatment for 14 days and followed by injection of second dose of PGF2α and 400 IU of PMSG, and the third group received injection of 0.004 µg of synthetic GnRH analogue for 7 days and followed on day 14 by a second injection of 125 µg PGF2α followed by second injection of 0.004 µg of synthetic GnRH analogue, the fourth group received two doses of 125 µg PGF2α with14 days interval. Blood samples were collected from all of the does for biochemical analysis. **Results:** Observations showed no external or behaviour changes recorded and slight changes in all groups in diagnostic parameters. The conception rate tended to be decrease specific with increase in other days **Conclusions:** This study showed that monitoring the biochemical diagnostic parameters in the four groups going different protocols we didn't record any significant different (P>0.05). The current study suggests that CIDR treatment for short and long are safe in Hejazi doe.

KEYWORDS: Goats, Progesterone, Biochemical diagnostic parameters.

INTRODUCTION

Goat is one of the earliest animals domesticated by human around 10,000 years ago.[1] According to FAO reports in 2014, the population of goats were of 1.011 million, having a 7% annual increase in the last 14 years.[2] Goat meat is widely consumed in developing countries. Total meat inventory is about 315 metric tons, and goat meat represents only 2% of this total.[2] The tropical and sub-tropical climate provides a unique habitant for goat raising, in Saudi Arabia, goat population is very high in number exceeding 2.2 million head.[3] Ardi, Hollandi and Shami goats are three distinct Saudi Arabian goat breeds.[4]

Our research focused on Hejazi (Pakistani, Indian or Hollandi) goats are usually black and long haired and used primarily for meat production. Few research had been done on Hejazi goats physiological conditions going under sex hormone therapy. Treatment with exogenous progesterone via an intravaginal device such as a controlled internal drug release dispenser (CIDR) reported that may assist initiation of ovulation followed by a formation of corpus luteum (CL) in suckled beef cows.[5] Goats undergo a breeding season during the fall and winter and a nonbreeding season during the spring and summer.[6] Series of gonadal hormones greatly influences goat breeding, controls follicular development and maintains goat rutting.[7] In the dairy goat industry, PMSG+CIDR or FSH+CIDR is most commonly used as effective protocols for superovulation.[8]

Gordon discover during the breeding season, when goats are actively cycling, estrus can be synchronized with PGF2α or one of its analogues, such as cloprostenol; however, the number of observations in different breeds is still insufficient for allowing firm conclusions.[9] In other point of view, in the goat during the early postpartum nursing period, treatment with CIDR before injections of low dose hCG may help to induce fertile estrus. From here we as researchers used CIDR in different protocols and this period of applying these protocol we monitor the blood physiological values. Blood contains diagnostically relevant parameters which

act as a pathological reflector, examining these blood parameters can provide important information for the diagnosis and prognosis of animal's health condition during and kind of treatment. Oestrus synchronization technologies frequently used are those progestagen-based protocols using either natural progesterone, fluoregestone, or medroxyprogesterone acetate, via intravaginal implants such as sponges or controlled internal drug release (CIDR) devices.[10,11] Research protocols for CIDR inserts have been focused on short-term (5-7 d) and long-term (12-19 d) length in small ruminants.[10,12,13,14]

Few published research study the heamatological and biochemical parameters of goat as Suguna group focused on insulin level in goats.[15] The liver is the largest parenchymatous organ that modulates systemic energy homeostasis in mammals and is the first sensor and processor to deliver maternal nutrients to a growing fetus via the umbilical vein.[16,17] The capacity of the liver to achieve and maintain its normal function and functional reserve is established early in life.[18]

Therefore, our study to preserve the haematological and biochemical diagnostic parameters of Hejazi goat during exposure to external hormonal treatment to develop specific data that can be use in future comprehensive breeding programs in order to improve Hejazi goat populations in world wide.

MATERIALS AND METHODS

Animals and housing

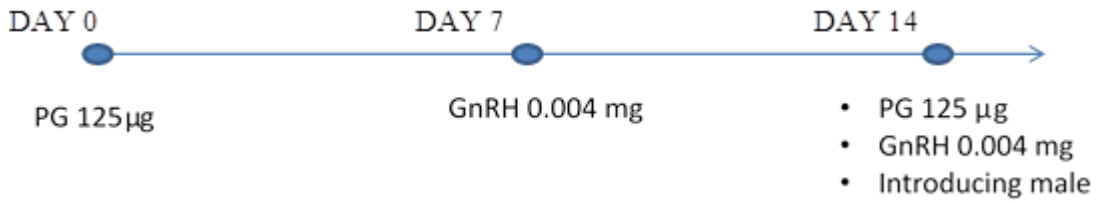
Forty fertile healthy does and 6 Hejazi bucks were used the animal were 35-70 kg body weight and 1.5-4 years old. The diets of the goats were supplemented according to pasture conditions with grass hay and alfalfa and grain pellets. Mineral supplements and water were available for ad libitum consumption. Our housing located in Souq Alkhamees town (32 N,13 E), about 50 kilometre south of Tripoli city. All experiments were approved by the Institutional Animal Ethics Committee.

Hormonal treatment

Hormone used for our experiment are: GNRH 0.004 mg: Receptal (Buserelin acetate; Hoechst-RousselAgri-Vet Company, Somerville, NJ), PGF2α 125 µg: Cloprostenol (Cloprostenol, imJuramate, Jurox Pty Ltd, Australia), Progesterone: CIDR 0.3 g: CIDR (CIDR, Eazi-Breed CIDR, Pfizer Australia, NSW), and PMSG 1000 iu: FOLLIGON (PMSG,Intervet UK Ltd, England).

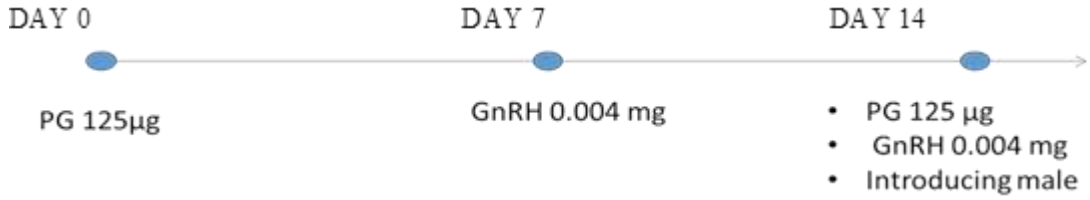
Experimental design

All non-pregnant does received an injection of 125µg of PGf2α, then they were randomly divided into four groups, each group contains 10 non pregnant does. All synchronization protocols started 7 days after the first PGf2α injection. Synchronization protocol.



Group 1 (CIDR-S protocol) (n=10), each non pregnant female goat received the following: on day 0 an injection of 125 µg PGF2α, on day 7 insertion of the CIDR, and on day 14 removal of the CIDR followed by injection of second dose of PGF2α and 400 IU of PMSG.

Group 2 (CIDR-L protocol) (n=10), each non pregnant female goat received the following: on day 0 an injection of 125 µg PGF2α, on day 7 insertion of the CIDR, and on day 21 removal of the CIDR followed by injection of second dose of PGF2α and 400 IU of PMSG.



Group 3 (GnRH protocol) (n=10), each non pregnant female goat received the following: on day 0 an injection of 125 µg PGF2α, on day 7 an injection of 0.004 µg of synthetic GnRH analogue, and on day 14 a second injection

of 125 µg PGF2α followed by second injection of 0.004 µg of synthetic GnRH.

Group 4 (PG group) (n=10), each non pregnant female goat received two doses of 125 µg PGF2α with14 days interval.

Blood collection and laboratory procedures

Blood samples were collected through a the jugular vein, 20 ml from each animal, by using 20 ml disposable plastics syringes with 18G needles. The samples were collected every other day starting from just before start till the removal the CIDR or the GnRH injection then the collection of blood samples became daily for three consecutive days. The test tubes were transferred and kept in room temperature anticoagulant free bottles allowed to coagulate at room temperature and centrifuged at 3,000 rpm for 15 min by Hettich universal centrifuge. The supernatant sera were then harvested and divided into 3-4 labeled tubes and stored in a deep freeze at -20 °C until analysed. Liver function test (LFT), Alanine Amino Transferase (ALT) and Asparate Amino Transferase (AST) analyzed using the modified method of Reitman and Frankel.[19] Serum levels of Ca, K, P, Mg analyzed using the Flame AtomicAbsorption Spectrophotometer.[20]

Data analysis

The data are expressed as mean ± standard deviation and statistical analysis was performed using two way ANOVA test using SPSS software (statistical system version 16/2007).

RESULTS

The daily observations showed no external or behaviour changes recorded during experiment with all groups eating and drinking similar amounts.

The effects of different protocols of treatment shows slight changes in all groups under the exposures with PGf2α, GnRH analogue, CIDR short, and CIDR long. The conception rate in Group I tended to be decrease specific with increase in other days in liver function live (GPT, GOT, and ALP), but not significantly metabolic profiling of the liver in our experiment results, (Table 1, 2, and 3).

Table 1: Show the effect of different treatment protocol on the serum liver enzyme GPT level during days of experiment.

Treatment	Days of Experiment							
	1	3	5	7	9	11	13	17
CIDR Short GPT	11.8 ± 4.5	15.2 ± 5.2	15.4 ± 2.7	19.2 ± 2.8	23.4 ± 10.1	(-)	(-)	(-)
CIDR long GPT	19.2 ± 3.8	24.4 ± 11.7	14.6 ± 6.2	21 ± 12.9	12.8 ± 4.6	11.8 ± 7	11 ± 3.2	15.6 ± 3.2
GnRH GPT	29.4 ± 17	14.2 ± 5.8	16 ± 7.4	20.2 ± 4.1	35.8 ± 16.2	(-)	(-)	(-)
PG GPT	20 ± 12	18.8 ± 6.6	24.4 ± 9.9	26.4 ± 14.3	22.6 ± 15.7	(-)	(-)	(-)

Table 2: Show the effect of different treatment protocol on the serum liver enzyme GOT level during days of experiment.

Treatment	Days of Experiment							
	1	3	5	7	9	11	13	17
CIDR Short GOT	25.6 ± 7.6	20.6 ± 7.7	14.8 ± 5.1	28.6 ± 8	31 ± 14	(-)	(-)	(-)
CIDR long GOT	24.5 ± 10.7	29.7 ± 9.3	18.2 ± 12	28.8 ± 14.6	16 ± 7.7	16.3 ± 6.6	20 ± 10.9	28.3 ± 9.8
GnRH GOT	30.5 ± 14.5	20 ± 9.6	22.3 ± 12.4	29.2 ± 4.9	37.2 ± 28.9	(-)	(-)	(-)
PG GOT	37.8 ± 13.6	42.8 ± 21.2	39.8 ± 26.3	31.8 ± 5.1	42.3 ± 18.6	(-)	(-)	(-)

Table 3: Show the effect of different treatment protocol on the serum liver enzyme ALP level during days of experiment.

Treatment	Days of Experiment							
	1	3	5	7	9	11	13	17
CIDR Short ALP	93.8 ± 21.3	42.5 ± 23.2	41.3 ± 22.2	33 ± 29.1	47.8 ± 26	(-)	(-)	(-)
CIDR long ALP	55.6 ± 18.4	69.6 ± 11.5	81.6 ± 22	74.6 ± 21.2	74.8 ± 19.3	64.8 ± 27.8	70.2 ± 22.7	81.2 ± 30
GnRH ALP	194.2 ± 43.6	221.2 ± 64.1	232.6 ± 60	231.6 ± 33	205.4 ± 71.8	(-)	(-)	(-)
PG ALP	104 ± 26.3	108.3 ± 31	118.6 ± 26.8	119.6 ± 44.4	116.3 ± 45.5	(-)	(-)	(-)

The results from our experiment on Day 0 until the finishing of four protocols group, did not differ ($P > 0.05$) among groups and during days in kidney biochemical parameters witch is (Uric acid, urea, creatinine, and calcium), (Table 4, 5, 6, and 7). The concentration of enzymes some days increased ($P < 0.05$), however is not significantly.

Table 4: Show the effect of different treatment protocol on the Uric acid level during days of experiment.

Treatment	Days of Experiment							
	1	3	5	7	9	11	13	17
CIDR Short Uric acid	2.2 ± 0.3	2.2 ± 0.2	2.8 ± 0.6	2.9 ± 0.4	2.6 ± 0.3	(-)	(-)	(-)
CIDR long Uric acid	2.4 ± 0.1	2.3 ± 0.2	2.3 ± 0.1	2.3 ± 0.2	2.1 ± 0.1	2.9 ± 0.3	2.4 ± 0.2	2.8 ± 0.8
GnRH Uric acid	2.3 ± 0.1	2.3 ± 0.2	2.5 ± 0.6	2.2 ± 0.2	2.1 ± 0.2	(-)	(-)	(-)
PG Uric acid	2.6 ± 0.3	2.1± 0.1	2.5 ± 0.4	2.4 ± 0.3	2.3 ± 0.3	(-)	(-)	(-)

Table 5: Show the effect of different treatment protocol on the Urea level during days ofexperiment.

Treatment	Days of Experiment							
	1	3	5	7	9	11	13	17
CIDR Short Urea	36.4 ± 1.7	41.6 ± 6.4	39.4 ± 2.6	34.2 ± 2.2	34.8 ± 4.8	(-)	(-)	(-)
CIDR long Urea	83.2 ± 9.3	83.4 ± 29.7	64.8 ± 19.8	92.8 ± 17.5	82.4 ± 37.5	80.2 ± 18.8	72.2 ± 11.9	44.6 ± 13.8
GnRH Urea	77 ± 28.9	76.3 ± 23.6	52 ± 17.5	47.5 ± 8.7	90.6 ± 15.9	(-)	(-)	(-)
PG Urea	57.2 ± 20.9	61.8 ± 19.8	57.4 ± 21.6	60.9 ± 23.5	51.8 ± 17.7	(-)	(-)	(-)

Table 6: Show the effect of different treatment protocol on the Creatinine level duringdays of experiment.

Treatment	Days of Experiment							
	1	3	5	7	9	11	13	17
CIDR Short Creatinine	0.22 ± 0.13	0.98 ± 0.23	1.28 ± 0.3	1.32 ± 0.11	1.44 ± 0.21	(-)	(-)	(-)
CIDR long Creatinine	1.5 ± 0.77	1.05 ± 0.29	2.36 ± 1.94	2.16 ± 0.76	1.4 ± 0.46	1.66 ± 0.52	1.66 ± 0.49	1.59 ± 0.58
GnRH Creatinine	1.79 ± 0.49	1.37 ± 0.21	1.4 ± 0.37	1.37 ± 0.17	1.79 ± 0.36	(-)	(-)	(-)
PG Creatinine	1.64 ± 0.41	1.46 ± 0.51	2.04 ± 0.52	2.04 ± 0.44	1.6 ± 0.46	(-)	(-)	(-)

Table 7: Show the effect of different treatment protocol on the Calcium level during days of experiment.

Treatment	Days of Experiment							
	1	3	5	7	9	11	13	17
CIDR Short Calcium	5.7 ± 1.3	6.9 ± 1.7	6.7 ± 0.3	7.4 ± 1.0	7.3 ± 1.3	(-)	(-)	(-)
CIDR long Calcium	5.8 ± 1.64	6.7 ± 1.41	7.0 ± 0.8	6.4 ± 0.7	6.8 ± 1.04	5.4 ± 1.4	4.9 ± 1.3	6.6 ± 1.5
GnRH Calcium	1.79 ± 0.99	1.37 ± 0.96	1.4 ± 1.02	1.37 ± 1.63	1.79 ± 0.99	(-)	(-)	(-)
PG Calcium	1.64 ± 2.38	1.46 ± 1.72	2.04 ± 1.55	2.04 ± 0.86	1.6 ± 1.63	(-)	(-)	(-)

In our experiment, there was no effect of CIDR insertion on short or long protocols on biochemical parameters in Hejazi doe. As expected, CIDR insertion don't have effect on healthy of breed undergoing experiment. The

CIDR short protocol doe group even after the treatment removed no changes on the parameters determined to significant.

DISCUSSION

The present study was conducted to determine the effect of different hormonal protocols on the haematological and biochemical diagnostic parameters to assess Hejazi goat health during treatment. All researcher focused on several domestic goat (Capra aegagrus hircus) which distributed all over the world and breed for meat, milk, butter, cheese, skin and fiber productions. Goat is known within the content that it is a domestic ruminants that can survive under wide range of climatic conditions.[21] The dairy goat was called the "poor man's cow", in the past breeding method of dairy goats was used to provide impoverished farmers and herdsmen with limited income sources.

A routine synchronization treatment using intravaginal CIDR device for 10 days, together with a prostaglandin injection, 2 days before CIDR removal, efficiently induces and synchronizes estrus and ovulation during the breeding as well as during the nonbreeding seasons in goats.[22] In the present study, The Etawah cross bred does were synchronized using CIDR implants for 10 days combined with PGF2α injection. The profile of hormone (Progesterone, Estradiol -17ß and LH) and vaginal histology during estrus were examined.

However, CIDRs are considered to be expensive when the benefit/cost ratio is evaluated and compared to vaginal sponges. For this reason, some researchers such as Guido group and Amorim group have evaluated the repeated use of CIDR in order to reduce costs without altering reproductive performance.[23,24] Moreover, these researchers have used this device for up to two consecutive times, without significantly reducing protocol cost. The repeated use ofCIDR should make its usage cheaper. Published research has reported methods of estrous synchronization that are effective in both sheep and goats. While the use of CIDRs in sheep has been approved for use, research on various lengths of protocols in sheep and goats have not been directly compared for efficiency in estrous response or subsequent fertility. Using multiple hormonal controls in short-term synchronization protocols gives an increased ability to control luteal and follicular dynamics.[13] One of the benefits to short-term progesterone protocols is the ability to synchronize females in a short period of time. Long-term synchronization protocols in sheep and goats have proven to result in shorter intervals from CIDR removal to estrus when compared with short-term protocols.[25,26] Our results showed that using of CIDR short term is save and have no effect on doe health form he it cheaper to be used from and our group agree with other researchers. During midgestation, maternal undernutrition alters the liver weight of fetuses in sheep.[27,28,29,30] Camacho group discovery same alters in cattle liver.[31] Even affects insulin secretion too.[27] Our research team found that liver function enzymes during protocol resulted no significant changes even there altersin liver weight.

The normal ranges for ALT, AST and ALP are 7-24 IU/L, 43-132 IU/L and 7-30 IU/L.[32,33] Serum levels of AST, gamma glutamyl transpeptidase (GGT), ALP and cholesterol are those conventionally used for diagnosing human and domestic animal hepatic damage.[34] Whereas liver enzymes such as ALT, which is a liver specific hepatocellular enzyme released by hepatocellular damage, more than GGT, is used to assess liver damage.[35] Specifically, ALP and cholesterol are used to detect bile obstruction, i.e. mild and progressive damage to the liver.[34] The data in the present study show and agree with other researcher that the serum urea levels were within the established range of 3.5-10.7 mmol/L and Even with same research group that creatinine values in the current study were within the normal range of 100-200 µmol/L reported for healthy goats.[32]

Our results showed that monitoring the biochemical diagnostic parameters in the four groups going different protocols we didn't record any significant different ($P>0.05$). The current study suggests that CIDR treatment for short and long are safe in Hejazi doe.

Competing of interest

The authors declare that there is no competing of interests regarding the publication of thispaper.

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Ethical approval

The study was approved by the Institutional Animal Ethics Committee.

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