Contents

The Abbreviations

1.	AG	Abdominal Girth
2.	BC	Beta-Carotene
3.	BCMO1	BC 15,15'-Monooxygenase
4.	BCO2	BC Oxygenase 2
5.	BCS	Body Condition Score
6.	BG	Brisket Girth
7.	BH	Back Height
8.	BL	Body Length
9.	BM	Body Measurements
10.	[Ca2+]I	Calcium Homeostasis and Impairs
11.	CL	Corpus Luteal
12.	CRABP	Cellular binding-proteins for retinoic acid
13.	CRALBP	Cellular Binding-Proteins for Retinalde-hyde
14.	CRBP	Cellular Binding-Proteins for Retinol
15.	E2	Estradiol
16.	EC	The Estrous Cycle
17.	EIA	Enzyme-Immunoassay
18.	ERα	Neuronal Estrogen Receptor α
19.	FF	Follicular Fluids
20.	FSH	Follicle-Stimulating Hormone
21.	GnRH	Gonadotropin-Releasing Hormone
22.	HG	Hind Girth
23.	IGF-1	Insulin-Like Growth Factor 1

24.	IU	International Units
25.	Kg	kilogram
26.	LBW	Live Body Weight
27.	LH	Luteinising Hormone
28.	NO	Nitric Oxide
29.	NRC	National Research Council
30.	$O2^-$	Superoxide Anion
31.	OH	Hydroxyl Radical
32.	OS	Oxidative Stress
33.	P4	Progesterone
34.	PGF2α	Prostaglandin F2α
35.	PRL	Prolactin
36.	RH	Rump height
37.	ROS	Reactive Oxygen Species
38.	SPSS	Statistical Package For Social Science
39.	TD	Thigh Diameter
40.	TL	Thigh Length
41.	vit. A	Vitamin A
42.	WH	Wither Height

6. Summary

During the last two decades, it has been shown that some specific nutrients play an important role in growth, development, reproduction and immunity. Among of these nutrients, BC (precursor of vitamin A) is required not only for maintaining vital tissues in the reproductive tract but also for keeping the body in good health. Feed of sheep is mainly poor in vitamin A, simply because of deficient BC in roughages, cereal stubble wheat straw, stored alfalfa hay and barely grain. Although green forages are the major source of carotenoids including beta-carotene (BC), but they are not available throughout the year. This means that BC should be taken from exogenous sources in order to cover the deficiency of vitamin A from one side and to fill the tissue vitamin A reserves from the other side. Therefore, the aim of this study was to investigate the long-term effect of BC on LBW gain, age at puberty, number and percentage of estrus coming post-puberty, types of estrous cycle following puberty and P4 and E2 profiles at puberty and pre-and post- puberty in Farafra ewe lambs. The results of this study could be summarized as follows:

- BC had a positive effects on LBW gain at puberty, number of estruses after onset of puberty, percentage of short cycles after puberty and E2 output at puberty (first estrus) and post-puberty.
- The mean date of regular cycling was insignificant lower in the treated animals than in the controls.
- BC did not promote precocious puberty and did not increase P4 level post-puberty.

- Significant variations in the P4 and E2 levels pre and post puberty have been found among individuals within each group.
- Age at puberty in the treated group was insignificant earlier than in the controls. LBW during onset of puberty represented 60 % (treated animals) and 54 % (controls) of the adult weight.
- BC had a significant positive effect on all BM at puberty except the measures Ag and HG compared with the controls.
- At puberty, E2 concentration was significantly positively correlated with TL in the two groups.
- E2 value at pre-puberty was significantly positively correlated with LBW and all BM in the animals treated by BC, while, in the controls the E2 value was significantly positively correlated with LBW and all BM except BL.
- At puberty, P4 concentration reached with no significance ≥ 1.0 ng/ml blood serum in both treated and non-treated animals.
- P4 value at pre-puberty was significantly correlated with LBW, BG, AG, TL and TD in the animals treated by BC, and not the controls.
- Post-puberty, the P4 concentration was significantly correlated with HG in the treated animals and with BL and BG in the controls.
- There were significant variations in both E2 and P4 concentrations among individuals within each group throughout the experiment.
- BC at puberty was significantly ($p<0.001$) higher in the treated animals than the non-treated ones.

- BC concentrations at pre-puberty were significantly positively correlated with RH, BH, WH, HG and TD in the treated animals, and not in the controls. Post-puberty, BC concentration was significantly positively correlated with TL in the treated animals, and not the controls.
- Vit. A at puberty was significantly higher in the treated animals than the non-treated ones.
- There was inversely relationship between BC and vit. A concentrations since when BC level increases in the blood serum increases with it the vit. A and vice versa.
- There is highly significant positive correlation between the BC and vit. A concentrations during post-puberty in the treated group ($r = 0.71$, $p< 0.001$) and the controls.
- The numbers and percentages of short EC coming after onset of puberty were significantly higher in the animals treated by BC than the controls.
- While the significance in the normal and long EC was disappeared between the two groups.
- The first EC (puberty) was short with mean 6.20 ± 1.74 days (range 4 – 13, d) in the treated animals vs. 7.40 ± 1.97 days (range 3 – 13, d) in the controls.
- The mean normal EC after puberty by 69 days was insignificantly lesser than in the controls (13.23 ± 1.81 days (range 7 – 27, d) vs. 15.67 ± 1.62 days (range 10 – 24, d).
- The mean concentrations of BC at puberty and estrous and met-estrous phases were significantly higher in the animals treated by BC than the controls.

- BC levels were significantly higher in estrous and met-estrous phases (after onset of puberty) in the treated animals than the controls.
- BC, vit. A and E2 levels were significantly higher at puberty in the treated animals than in the controls.
- There were significantly negative correlations between vit. A and E2 and P4 concentrations in the estrous and met-estrous phases after puberty in the treated animals.
- Both vit. A and BC levels were significantly higher at puberty and estrous and met-estrous phases (after onset of puberty) in the treated animals than in the controls. Further, there were significantly negative correlations between vit. A and BC concentrations in the estrous phase after puberty in the treated animals.
- From this study, BC has achieved good results in improving LBW, BM, percentage of esturses after onset of puberty, increasing E2 concentrations at puberty and reducing a little bit age at puberty in Farafra ewes. Thus, it is recommended to apply in animal farms. Otherwise, BC is still in need of further study particularly in improving estrous activity out of breeding season.