العلاقة بين فيتامين " هـ" والكاروتينات الكلية وفيتامين "أ" فى كبد الحيوانات الزراعية المصرية فى الصيف

ى٠ ل٠ عوض ، م٠ ط٠ فؤاد ، ن٠ جازيه ، م٠ أ٠ مصطفى

تناول البحث دراسة العلاقات بين مستويات فيتامين (أ) والكاروتينات كنسبة بينهم فى الماشية ووجدت أنها فى ترتيب تنازلى بالنسبة للأغنام ـ الجاموس ـ العجول الصغيرة ـ واخيرا عجول التسمين البقرى ـ كما أن قيمة فيتامين " هـ " هى أكبر نسبة فى العجول الجاموس ثم الأغنام والجاموس الكبير ـ الجمال وأخيرا عجول التسمين ٠

كما أنه بدراسة الترابط بين فيتامين " هـ " وفيتامين "أ" فوجد أن هناك علاقة ايجابية بينهما فى الأغنام والعجول الجاموس وعلاقة ايجابية بين مستوى فيتامين " هـ " والكاروتينات فى الجمال ـ الأغنام ٠

واتضح أن عجول التسمين صيفا تحتاج الى اضافة فيتامين "أ" ، " هـ" ٠

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VITAMIN E, TOTAL CAROTENOIDS AND VITAMIN A CORRELATIONS IN LIVER OF EGYPTIAN RUMINANTS IN SUMMER

(With 3 Tables)

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SUMMARY

In this paper vitamin A:carotenoids ratio was studied and ordered in sheep, camel, buffaloes calves and lastly fattening stears. Vitamin E values were determined in buffaloe calves, sheep, buffaloes, camels and lastly steers. There was a positive correlation between vitamins E and A in sheep and buffaloe calves and positive cerrelation between vitamin E and carotenoids in camels, sheep. Fattening steers at summer time seem to be in need of vitamin additives in respect to vitamins A and E.

INTRODUCTION

Vitamin A is obtained from food either as the vitamin itself or from the plant pigments, carotenes which can be converted into vitamin A in the wall of the small intestine. Both vitamin A and carotenes are important in ensuring adequate supply of vitamin A to the tissues and excess vitamin is stored in the liver (VARLEY 1969). The efficiency of converting carotenoids to vitamin A varies with species. Ruminants are less efficient than rodents or swines. On the other hand vitamin E is less abundant in most visceral organs than in muscular and adipose tissues and at high level of intake it is stored chiefly in the liver.

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ROBERTS et al. (1962) studied liver vitamin A stores in beef cattle following intraruminal injection or oral administration of vitamin A. In those given vitamin by injection the concentration was tribled within 7 to 21 days. Values then declined gradually to initial level. The pattern of change was similar in those given vitamin A in the feed but the rise was much smaller. PANDY and ROY (1966) found that vitamin A content of buffaloe liver during summer season is 45, 29 ± 3.47 in females and 54, 43±7.08 in bulls as ug/gm of fresh tissue. GARTNER et al. (1968) mentioned that there is an inherent ability for storing vitamin A in polled Hereford X Hereford cattle.

Correlations between the three concentrations were observed in milk. KRUKOVSKY et al.(1950) found that while there was a sgnificant positive correlation between the tecopherol and carotenoids content of cows milk, yet tocopherol and Vitamin A were correlated. GRIEB (1966), studied vitamin A and carotene content of milk and its behaviour on transfere to pasture. The correlation between vitamin A and carotene content of milk showed little significant difference for both feeding periods. VEDAWAYAGAN (1966) reported on vitamin A (96.4 ± 12?95 I. U. per 100 ml.) and carotenoids (6.3 ± 0.8 Ug/100 ml.) in plasma of 16 female buffaloe from Medras. He attributed the lower plasma carotenoid content than that of the cow to the better conversion of carotene to vitamin A by the buffaloe.

DAVIES and MOORE (1941) found that in rats restricted to a diet deficient in both vitamins A and B, the reserves of vitamin A were used much more rapidly than in control animals given dl- - tocopherol and prolonged deficiency of vitamin E led to secondary deficiency of vitamin A. WIESNER et al.(1970)

reviewed the relationship between vitamin E and A by the following observations: Vitamin -A- free nourished animals had a longer life span if supplemented with vitamin E. Liver vitamin A reserves keep longer when there is no deficiency of vitamin E. vitamin E in the form of l-tocopherol serves to save more testinal tract. Symptoms of vitamin A deficiency in rabbits appeared only when this was prodisposed by vitamin E deficiency and the former improved E supplementation. In treating creatinurea in rats, small doses of vitamin E had a synergistic effect with Vitamin A. BAYFIELD et al. (1969) discussed the relationship between carotenoids and tocopherol levels in serum of a apparently healthy dairy cattle. There was a close relationship between serum tocopherol and beta carotene, between serum tocopherol and total carotenoids and between serum beta caretene and total carotenoids. WIESNER et al., (1970) mentioned that a defined carotene intake and small doses of vitamin E increases liver vitamin A reserves yet with large doses the reverse effect was observed.

The aim of this work is to investigate the correlation between liver vitamin E, total carotenoids and vitamin A. Data recorded were chosen at summer season with low supply of carotenes. Reinvestigations during the winter season when there would be ample supply of carotenes is the subject of another work where more detailed studies need to be fulfilled.

MATERIALS AND METHODS

At the time of slaughter in Cairo abbattoir fresh liver samples were taken from 33 fattening steers about 18 months old, 27 nonpregnant nonlactating buffaloes, 87 young buffaloe

calves about 2 months old, 44 Ossimi lambs and 42 male mature camels. Out of these, only 30 camels were studied for vitamin E and A correlation. These animals were apparently clinically healthy and postomortem examination showed them to be free from tuberculosis and any cystic invasion.

Total carotenoid, vitamin A and E were estimated photometrically using Unicum Spectrophotometer S.P. 600 and cell 1 cm depth. An artificial standard of potassium dichromate was used for total carotenoids at wave - length 420 Um. Vitamin A was determined colorimetrically as described by OSER (1965). The Vitamin values in mcg per gm fresh liver tissue was calculated after correction for the interfering carotenoids. For estimation of tocopherols the ferric chloride dipyridyl method, Emmerie and Engel Reaction was used after KAUNITZ and BEAVER (1944) as described by OSER (1965).

RESULTS

Results are demonstrated in tables I,II,and III. As shown from tables I and II sheep have the highest vitamin A mean values followed by the buffaloe, camels, buffaloe-calves and then fattening steers. While vitamin A: carotenoid ratio is high in sheep then followed by camel, buffaloe and buffaloe calves and lastly come the fattening steers. Table III shows that vitamin E values were in the following descending order. buffaloe calves, sheep, buffaloes, camels and lastly fattening steers; However, the order of carotenoid levels were sheep, fattening steers, buffaloes, camels and buffaloe calves.

Table I : Vitamin A to Carotenoids Ratio in Livers of Egyptian Ruminants at Summer .

Species	No.	Range	Mean
Camel	30	44.0 - 330.2	97.88 ± 16.9
Sheep	44	2.2 -1045.6	167.0 ± 30.75
Buffalo	27	2.6 - 159.3	62.01 ± 7.9
Buffalo - calve	27	2.2 - 440.1	61.6 ± 6.2
Steer	33	1.1 - 202.4	28.7 ± 6.6

Table II : Vitamin E and Vitamin A in livers of Egyptian ruminants at summer .

Species	No.	Vitamin E Ug/gm	Vitamin A Ug/gm	Correlation coefficiant r	Significance at 5 %
Steer	33	1.6 - 9.21	1.5 - 35.70	+ 0.08	Insig.
		5.08± 8.35	13.49± 0.22		
Buffalo	27	5.68-13.64	10.09-137.50		
		9.13± 0.45	70.21± 8.03	+ 0.06	Insig.
Buffalo -calve	87	2.86±39.92	2.2 -146.20		
		20.79±0.90	28.51± 3.18	+ 0.23	Sig.
Sheep	44	5.14 - 449	4.4 -205.00		
		17.0 ±1.25	72.76±4.9440	+ 0.95	Sig.
Camel	30	2.17 -14.11	13.0 -152.5		
		0.69 ± 1.10	61.1 ± 6.9	- 0.36	Sig.

Table III : Vitamin E and carotenoids in livers of Egyptian ruminants at summer .

Species	No.	Vitamin E	Total carotenoids	Correlation coof.	Sign.
		Ug/gm	Ug/gm	r	
Steer	33	1.52 - 9.21 5.08 ± 0.35	0.18 - 6.78 1.144± 0.33	- 0.245	Insig.
Buffalo	27	5.68 -13.64 9.13 ± 0.45	0.37 - 2.06 1.12 ± 0.08	+ 0.324	Insig.
Buffalo-calve	87	2.58 -39.92 20.79± 0.90	0.02 - 2.98 0.735± 0.55	- 0.14	Insig.
Sheep	44	5.17 -44.90 17.0 ± 1.25	0.13 - 7.83 1.225±0.219	+ 0.377	Sign.
Camel	42	2.14 - 14.11 7.34 ± 0.53	0.31 -2.890 1.063±0.135	+ 0.535$_5$	Sign.

DISCUSSION

The mean levels recorded here show that mean values for vitamin A as well as carotenoids are within normal limits. BLOOD and HANDERSON (1960) mentioned that hepatic normal levels of vitamin A and carotene in cattle are in the order of 60 and critical levels at which signs are likely to appear are 2.0 and 5.0 mcg respectively. However in this study some individual, except camel, showed critical values at which the possibility of appearance of manifestation exerts. This low level may be due to dietetic error as these animals are kept usually for periods before slaughtering on a high protein diet which may result in the exhaustion of their liver vitamin reserves.

Vitamin A: carotenoids ratio demonstrates difference in the capacity of conversion. This capacity is in the following order, sheep, camels, buffaloes, buffalo calves and lastly steers. It is worthy to mention that the icteric index of the serum of these animals comes in the reverse order (AYOUB et al., 1960). GARTNER et al. (1968) mentioned that there is an inherent ability for storing vitamin A in Polled Hereford X Hereford cattle.

The liver vitamin A values in Egyptian buffaloes(70.21 ± 0.03 Ug/gm) is higher than that reported by PANDEY and ROY (1966) as (45.29 ± 3.43 Ug/gm)in fresh tissue in females and (54.43 ± 7.08 Ug/gm) in males in India.

The differences in liver vitamin E in different ruminants may be a species difference as well as due to nutritional factors. Buffaloe-calves had the highest vitamin E levels. This

coincides with what WHITING and LOSSLI (1948) found. They observed that new born animals normally have some hepatic stores of the Vitamin. These animals usually have great care from the owner and usually fed diet of high nutritive value and sometimes supplemented with Vitamin - feed - supplements. Sheep had higher liver vitamin E contents as these are supposed usually to graze fresh pastures. OSER (1965) mentioned that milk from cows on fresh alfa-alfa pasturage contains higher vitamin E content. Sheep milk and colostrum contains higher percentage of vitamin E as compared with the cow, HILL (1957). Camels and steers are kept at summer on dry rations and concentrates of low vitamin E content, therefore of the lowest vitamin E value.

The data obtained show (a) no clear correlation between vitamin E and A in steers and buffaloes but a week positive correlation in buffaloe- calves and strong positive in sheep (b) Positive correlation between liver vitamin E and total carotenoids in the camel, sheep and buffaloe. Similar observations were recorded in milk and serum, KRUKOVSKY et al. (1950) found that while there was a correlation between the tocopherol and carotenoid content of cows milk yet tocopherols and vitamin A were not correlated. BAYFIELD et al. (1969) demonstrated a close relation between alfa tocopherol and total carotenoids in serum of apparently healthy dairy cattle. The obvious significant correlation between vitamin E and A in livers of sheep contrary to negative correlation in the camel could be described as species difference.

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