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HEALTH AND PERFORMANCE OF ARABIAN RACING CAMELS FED ON ADVANCED FIBER NUTRITION (FIBERPOWER®)

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ABSTRACT

Most of camel nutrition programs are based on ruminant formulations due to lack of scientific data. Camel trainers use their traditional ways in racing camel feeding depend mainly on Barley and green Alfalfa beside to other food stuff like dates, honey, molasses and cow`s milk. This experiment was conducted in a camel barn in Ajman, United Arab Emirates. The effect of feeding controlled bio-fermented forage fiber-based feeds called FiberPower® on 5 Arabian racing camels under Arabian Peninsula climate. Blood sample collected before feeding FiberPower®, and 3 blood samples collected after applying our feeding formula. Changes in both hematological and biochemical parameters had been conducted for the 5 camels in our experiment. Hematological and biochemical parameters had been tested. Comparison between results before and after FiberPower® feeding showed improvement of the optimum values of White Blood Cells (WBCs), Blood Urea Nitrogen (BUN), Lactate Dehydrogenase (LDH), Creatine Kinase (CK), and Aspartate Transaminase (AST) which reflected on good health and performance of Arabian racing camels. For example, BUN decreased significantly from 20.2 (±4.1) mg /dl to 13.8 (±1.8) mg /dl after only 9 days of feeding on FiberPower® and nearly the same value of optimum level which is 13 mg /dl. However the other hematological and biochemical parameters did not show any significant difference.

Keywords: camel nutrition, fermented forage, fiber fresh feeds, racing camel feeds.

INTRODUCTION

Feeds for camels usually developed based on ruminant formulations due to lack of specific data (Manefield and Tinson 1997, Ellard, 2000).

Acidity is common in camels due to, absorption of Sodium (Na) is 60% faster in camels than in sheep and goats, so, accumulation of Chloride (Cl) in the hind stomach. Racing camels required more energy than other camels which are rearing for other purposes. Racing camels have endurance race type with distance ranged from 3 up to 8 km according to age so, which required high energy diet 37 *MJ* for maintenance for adult camel with average 450 kg body weight beside extra 8.2 *MJ* per-Hour of work or, 1.05 *MJ* per-km travelled (Manefield and Tinson, 1997).

Challenge is to fulfill this high energy from concentrates without rumen acidity problems. Trainers are focusing on grain concentrates diet with restriction of roughages that leads to acidity and subsequently Thiamine deficiency. Volatile fatty acids (VFAs) production from fermentation in camels is 50% higher than sheep (Ghali et al, 2011); absorption of Fatty acids is 70% faster in camel than in sheep and goat. The Voluntary Feed Intake (VFI) of Camels is optimized when the roughages component of the diet is 70% (Manefield and Tinson 1997). In general Camelids appear to be significantly more efficient in digesting dry matter, fiber, cellulose and crude protein than other ruminants and domestic non-ruminants.This is probably due to rapid and frequent cycling of the stomach contents (Khan et al., 2003).

Dry matter intake (DMI) for camels varies widely, with studies reporting values ranging from 1.3 to 4% of body weight, such as 2.5% (Guerouali and Wardeh, 1998; Wardeh, 1998). Practical feeding protocols suggest that 1.7 to 2% of body weight is sufficient DMI for racing camels (Manefield and Tinson, 1997).

Crude protein requirements of 300 g/day appear to be sufficient for racing camels, but it is important that the biological value of the protein is high (Manefield and Tinson, 1997). Most trainers in the United Arab Emirates (UAE) and other Arabian Gulf countries approximate the daily food intake of racing camels to consist of soaked whole barley, green alfalfa, dates, molasses, and fresh cow's milk (Mahgoub et al., 2014; Ossama et al., 2012).

On this diet, the camels generally perform well and look healthy, but racing camels often suffer from nutritional-related diseases and problems. Restricting good-quality roughages and relying primarily on grain concentrates can lead to high rumen acidity and increased lactate accumulation in the blood, which can lower blood and muscle pH. This is evident in routine blood test results, as many racing camels have high levels of lactate dehydrogenase (LDH), creatine kinase (CK), aspartate aminotransferase (AST), alanine transaminase (ALT), and low vitamin B1, all of which negatively affect the performance of racing camels (Faye and Bengoumi, 2018; Omer et al., 2015). Using feedstuffs with low biological value of protein can increase urea recycling, which can explain the unusual increase in blood urea nitrogen (BUN) in most racing camels (Shaltout et al., 2008; Wensvoort et al., 2001).

Few years ago, performance of racing camels significantly improved as good times are for 3 km is 5:30 min and for 4 km is 7 min ((Manefield and Tinson 1997). It means that average speed of the distance of 4 km (3-year-old racing camel) was 34.3 km/hr., this average speed reach to 42 km/hr (race track 4km) recently according to the competition results published on the website of Dubai Camel Racing Club (DCRC, 2023) This result is satisfied to trainers. This improvement refers to use feed supplements and medication that resolve problems related to nutrition. No doubt, that applying scientific feeding practices satisfy physiological digestion of racing camel can optimize performance better that wasting effort in medication and supplement that mask nutritional problems. It is clearly that routine blood test for racing act as a mirror for effect of type of feeds on normal physiological function of the camel such as liver, kidney and muscle enzymes.

The aim of this study was to show the influence of feeding controlled bio-fermented forage based feeds FiberPower® on the blood hematological and biochemical parameters of Arabian racing camels under Arabian Peninsula climate which reflected on health and performance of these camels.

MATERIALS AND METHODS

This Before- After study (Stewart-Oaten and Bence, 2001) was done in barns close to racing track in Ajman emirate in United Arab of Emirates (UAE) in 2020.

1. Animals and Nutrition

Five female racing camels (*Camelus dromedaries*) were used in this study. Their ages were from 10 months to 3 year. The camels were housed in barns close to racing track in Ajman emirate in UAE. They fed on traditional nutrition then shifted to advanced fiber nutrition.

1.1. Traditional nutrition programme

The racing camels were fed on traditional programme which composed of two meals one in early morning at 5:30 a.m. (2kg of dry alfalfa and 250 gm of dates), the second meal was at evening around 3:30 p.m. (1.5 kg of dry whale soaked barley). Drinking water was only one time without adding any other supplements.

1.2. Advanced fiber nutrition programme

The tested ration programme used in this study composed mainly of high energy completed feed called FiberPower® by Fiber Fresh Feeds Ltd. The ingredients are Lucerne (alfalfa) (58%), kibbled barley (35%), Xanotyde® which is a proprietary formulation from natural benefit yeasts in addition to vitamins A, D and the minerals; Copper, Cobalt and Zinc, molasses (4%), Dicalcium phosphate (1%), rumen protected fat or by- pass fat (1%) and Sodium salt (1%). FiberPower® is a wet ration with 45%

moisture packed in vacuumed plastic bag, as mentioned in Table 1. Feeding on advanced fiber nutrition was divided into four meals with dry alfalfa according to manufacture instructions and as described in Table 2. The quantity of FiberPower® dry matter was around 0.5% of body weight, also the quantity of alfalfa dry matter was around 1% of body weight. Drinking water was increased in times up to two times each day and giving electrolyte supplements (Startaid® Electrolyte powder – Mervue Laboratories – Ireland), after each extensive training.

2. Blood Samples

Blood samples were collected 4 times from 5 female camels; the first was before advanced fiber nutrition programme as traditional feeding programme had been done and the other 3 times were after beginning of advanced fiber nutrition (9^{th} ,24^{th} , 40^{th} days). From jugular vein in the upper third of each camel, blood was drawn by 18G needle, 10ml syringe then evacuated into two 5ml blood colleting tube one of them violet cover with EDTA as anti-coagulant for hematological analysis. Another with red cover dry tube was used for serum separation.

3. Hematological Analysis

By using Advia®2120i Hematological analyzer – Siemens - Germany (Camula Veterinary Laboratory, Dubai, UAE), WBCs, Neutrophils, Lymphocytes, Eosinophils, Monocytes, RBCs, Hemoglobin, Hematocrit (HCT) and Platelets count were determined.

4. Biochemical Analysis

After centrifugation with 6000 rpm, sera were separated for biochemical analysis using Vet Axcel® Chemistry analyzer – Alfa Wassermann – USA (Camula Veterinary Laboratory, Dubai, UAE) to determine Glucose, Creatine Kinase (CK), lactate dehydrogenase (LDH), Alanine Transferase (ALT), Aspartate Transferase (AST), Blood Urea Nitrogen (BUN), Creatinine and Iron.

Data obtained from hematological and biochemical analyzes presented as means ± standard deviation. The results were compared with the normal average reference values of camels and optimal values for good performance in racing Arabian camels breed with average age of two years old as shown in Table 3 (Elhag Elhag et al., 2016)

5. Statistical Analysis

The obtained results were statistically analyzed to get the significant differences ($p \leq 0.05$) between hematological and biochemical results by using EXCEL software 2010.

RESULTS AND DISCUSSION

Limitation of researches focusing on Arabian racing camels is a problem facing both scientists and owners. The main subjects of interest are related to metabolic and physiological demands of racing camels (Harris and Hultman, 1992). The racing camels' traditional diets and supplements are not based on scientific formulations as some of the rations contained protein in excess or low of their needs, which induce metabolic disorders (Kohnke and Cluer, 1992).

The correct quantities, proportions and advanced processing of traditional feed constitutes which are principally roughage and barley, remain the main lost in rascing camels. The animals may become chronic or acute ruminal acidosis and may suffer from thiamin (vitamin B1) deficiency; the latter leading to neurological disorders and death (Mohamed and Hussein, 1999).

This study aimed to offer scientific solution to overcome some of metabolic disorders in racing camels by using advanced fiber nutrition as FiberPower®.

From obtained results, both of CK and LDH enzymes significantly improved after less than one month and close to the optimum values with the same average age (Fig 1 & 2). Consequently,

FiberPower® has significant fast muscle recovery that was clearly proved after only 9 days of starting feeding. The highly digestible and high quality protein profile helps muscle to keep high performance level. These finding agree with Mohamed and Hussein (1999), who mentioned that the good quality and suitable amount of protein sources in rations are one of the main factors for protecting racing camels from chronic diseases. The high level of BUN in traditional feeding programme in this study is agreed with Emmanuel (1984).

High BUN level and renal dysfunction are common complains of trainer because of improper nutrition due to excessive or low protein intake and low quality digestible protein, and using feed stuffs are not match with the physiological function of rumen digestion in camels (Alfattah et al., 2012, Faye et al., 1992 and Homeida et al., 2009). Cultivated green alfalfa which is treated by urea fertilizer in poor land in Gulf area can be a reason of increasing the BUN especially in winter as mentioned by Emmanuel (1984). FiberPower® keeps Creatinine level on the optimum level without any negative changes, while BUN significantly improved after only 9 days from starting feeding (Fig 3 & 4).

Leukocytes of racing camel is usually up normal during racing season as the stress factors of competition and extreme training considered as the main reason of up normal changes (Johnson et al., 2013).High quality protein profile in FiberPower® improves values of Leukocytes. The diagram shows significant improvement of total count of white blood cells and keeps it within normal level (Fig 5).

The changes of other haematological parameters such as RBC, Hb, and HCT (Table 6) refer to the hemo-concentration before starting the experiment due, to the drinking programme was only once per-day, high dry matter percent (DM%) of the traditional feed stuff programme and, using of dates. The lower values of the same parameter after starting the experiment related to increase the drinking intake to be twice per-day, while the moisture per cent in FiberPower® (45%) and using of electrolyte supplement (Startaid®).

CONCLUSION

Feeding high quality green forage-based feeds preserved by controlled bio-fermentation process with correct proportion between grains and roughages will help in preserving optimum normal hematological and biochemical values of Arabian racing camels under Arabian Peninsula climate which reflected on good health and performance of these camels .

RECOMMENDATIONS

Comparative and further experiments are recommended for more data and analysis.

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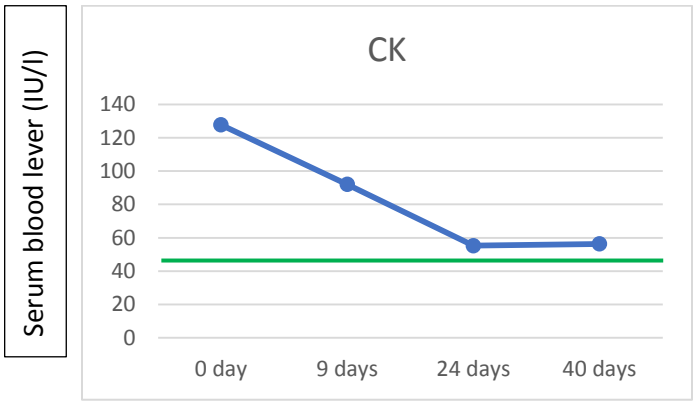

Fig. (1). Serum blood level of CK (—) and its optimum value (—)

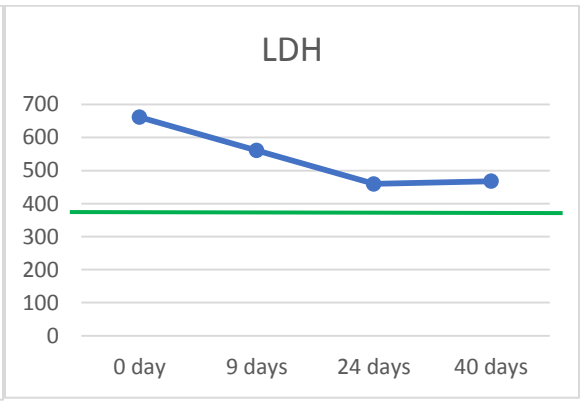

Fig. (2). Serum blood level of LDH (—) and its optimum value (—)

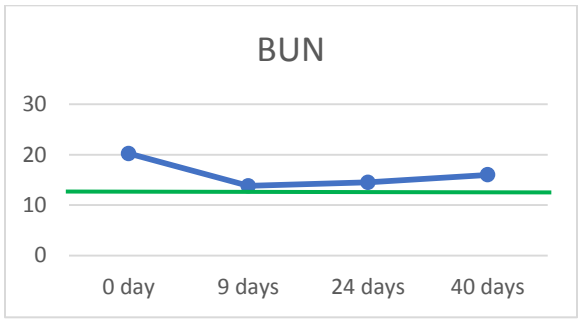

Fig. (3). Serum blood level of BUN (—) and its optimum value (—)

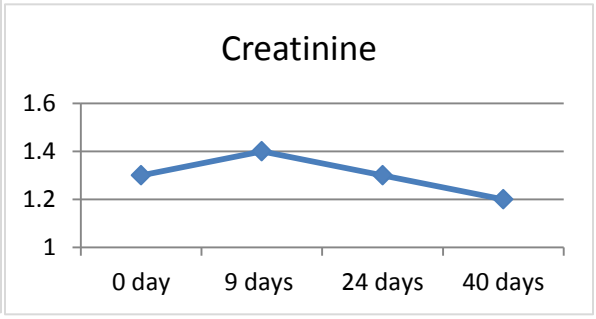

Fig. (4). Serum blood level of Creatinine (—).

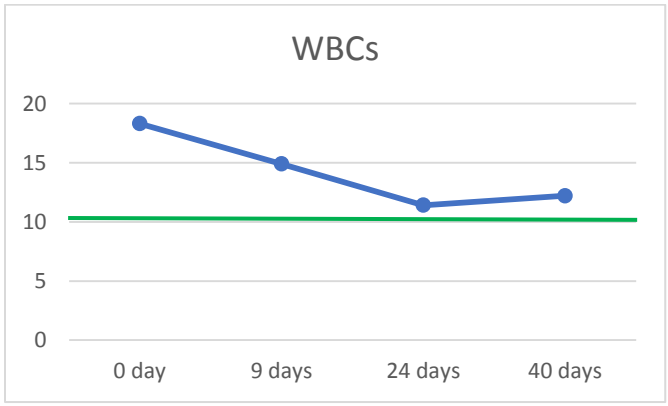

Fig. (5). Blood level of WBCs (—) and its optimum value (—)

Table (1). Typical analysis of FiberPower® according to dry matter basis.

Crude Protein	14.2%
Crude Fiber	18.4%
Crude Fat	3.5%
Digestible energy	12.2 MJ/kg
Dry matter	55%
Calcium	14.8 gm/kg
Phosphorus	5.9 gm/kg
Vitamin E	111 mg/kg
Selenium	0.4 mg/kg
Lysine	6.9 gm/kg
Methionine	2 gm/kg
Cysteine	2.2 gm/kg

Table (2). Daily feeding protocol for each camel.

Animal	Age/Month	FiberPower® 5:30 a.m.	Dry Alfalfa 9:00 a.m.	FiberPower® 3:30 p.m.	Dry Alfalfa 7:00 p.m.
Camel1	36	2kg	1.5kg	2kg	1.5kg
Camel2	24	2kg	1.5kg	2kg	1.5kg
Camel3	21	2kg	1.5kg	2kg	1.5kg
Camel4	10	1.5kg	1kg	1.5kg	1kg
Camel5	10	1.5kg	1kg	1.5kg	1kg

Table (3). Serum blood level of CK and LDH..

Parameter	Unit	Ref. Range	Optimum Value*	First Test (Zero day)	9 days later	24 days later	40 days later
CK	iu/l	40-120	46.3*	127.8 (±87)	92 (±51.7)	55.3 (±21.5)	56.3 (±10)
LDH	iu/l	275-450	419.9*	661.8 (±86.6)	561 (±71.7)	459.5 (±93.2)	468 (±62)

*Optimum values of female Arabian racing camel (2years old) (Elhag et al., 2016).

Table (4). Serum blood level of BUN and Creatinine.

Parameter	Unit	Ref. Range	Optimum Value*	First Test (0 day)	9 days later	24 days later	40 days later
BUN	mg/dl	15.5	13	20.2 (±4.1)	13.8 (±1.8)	14.5 (±2.1)	16 (±1.8)
Creat.	mg/dl	0.5-2.5	1.6*	1.3 (±0.1)	1.4 (±0.1)	1.3 (±0.1)	1.2 (±0.2)

Table (5). Blood level of WBCs and differential leukocyte counts.

Parameter	Unit	Ref. Range	Optimum Value*	First Test (Zero day)	9 days later	24 days later	40 days later
WBCs	10^3/µl	8-15	10	18.3 (±4.4)	14.9 (±3.6)	11.4 (±0.9)	12.2 (±0.9)
Neutrophils	%	40-60	50	57.8 (±5.6)	43.8 (±2.6)	42 (±4.7)	45.5 (±4.4)
Lymphocytes	%	25-45	40	32.2 (±4)	43.7 (±4.3)	42.6 (±5.6)	43.5 (±7.5)
Eosinophils	%	Up to 8	6	3.5 (±2.5)	5.5 (±2)	5.2 (±2.4)	3.6 (±1.4)
Monocytes	%	3-6	4	5.3 (±0.6)	4.8 (±0.6)	6.2 (±0.3)	5.8 (±1.6)

Table (6). Other Hematological and bio-chemical parameters comparison before and after feeding on FiberPower®.

Parameter	Unit	Ref. Range	Optimum Value*	First Test (Zero day)	9 days later	24 days later	40 days later
RBCs	x10^6/µl	7-10	8.5	11 (±1.6)	10.2 (±2)	9 (±1.3)	8.6 (±1)
Hb	g/dl	10-15	13-13.5	15.1 (±1)	13.5 (±1.3)	12.6 (±1)	12.2 (±0.7)
HCT	%	25-33	28-30	32.8 (±2.2)	30.6 (±3.2)	27 (±1.8)	26.8 (±1.7)
Platelets	No.	270-600	300-400	531.2 (±391.9)	507.8 (±187.1)	382.8 (±203.3)	367.5 (±105.5)

*Optimum values of female Arabian racing camel (2years old) (Elhag et al., 2016).

صحة واداء ابل السباق العربية المغذاة على الفايبر بور®

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الملخص العربي

ترتبط التغذية السليمة بالاساس بالحالة الصحية الجيدة والاداء العالي وخصوصا في ابل السباق . والتغذية السليمة تعتبر الوقاية والدرع الحصين ضد معظم الامراض فبناء جسم قوي يؤدي الى مناعة قوية وهذا كله يعتمد بالاساس على التغذية الجيدة.

وهناك ندرة كبيرة في المصادر العلمية الخاصة بإبل السباق العربية تحت ظروف اجواء شبه الجزيرة العربية ويقابل ذلك موروث شعبي ضخم متأصل منذ قديم الازل ولا يزال هو السائد في تغذية ابل السباق وفي بعض منها يمثل اخطاء فادحة ممكن ان تؤدي الى مشاكل بيطرية جسيمة مثل حموضة الكرش وزيادة نسبة اليوريا النيتروجينية في الدم مما قد يؤدي الى اعتلال الكلية وحدوث النفوق.

ومن خلال هذا العمل تم تسليط الضوء على المردود الصحي لاستخدام التركيبات العلفية الحديثة مثل علف فايبر باور® في ابل السباق تحت اجواء شبه الجزيرة العربية من خلال قياس وتحليل المؤشرات الدموية والكيمياء الحيوية لخمس ابل سباق مختارة قبل وبعد التغذية على فايبر باور® ومقارنتها ليس فقط بالحدود الطبيعية بل بالقيم المثلى التي تمثل اعلى مستويات الصحة والاداء لهجن السباقات.

وقد وجد اختلافات معنوية بين قبل التغذية وبعدها على فايبر باور® في عدة قياسات ومؤشرات مثل اليوريا الدموية النيتروجينية Blood Urea Nitrogen (BUN), Lactate Dehydrogenase (LDH), Creatine Kinase (CK), and Aspartate Transaminase (AST).

حيث قلت مستوى اليوريا الدموية النيتروجينية Blood Urea Nitrogen (BUN) من (±4.1) 20.2 ملجم / ديسيلتر قبل التغذية على فايبر باور® الى (±1.8) 13.8 ملجم / ديسيلتر بعد التغذية عليه بتسعة ايام فقط ويقارب المستوي المثالي لهذا المؤشر والذي يمثل 13 ملجم / ديسيلتر مما ينعكس بالتالي الى حالة صحية جيدة واداء مثالي لهذه الابل.

وبالتالي يعتبر هذا النوع من التغذية مناسب جدا من الناحية الصحية تحت الظروف المناخية لشبه الجزيرة العربية كما انه مناسب لتغطية احتياجات ابل السباق من العناصر الغذائية المهمة.

الكلمات الدالة: تغذية ، ابل السباق ، علف، الصحة ، الاداء، اليوريا.