A study of measuring blood sugar levels in cows in areas around Nasiriyah city using the ready-made ACCU_CHEK method and using a kit.

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Abstract :

Measuring the concentration of sugar in cows is very important to assess their health status, as well as the possibility of treatment with solutions containing sugar to treat a number of diseases that affect cows. The range of sugar concentration in cows is 42-75 mg / 100 ml of blood. The study aimed at the possibility of using the ACCU-CHEK device with human use to measure sugar concentration in cows due to the speed of results, ease of use, low price of the device and the attached tapes, and the possibility of transporting it and working in the field compared to the spectrometer and kit attached to it. This study was designed to compare two methods for measuring the concentration of sugar in the blood of cows, which are kit, in which 52 blood samples were used from healthy and sick cows and calves living in the suburbs of Nasiryah city, and the ACCU-CHEK rapid device method using a drop of blood from 52 heads of cows and calves for direct use. Accu-chek (device) can be used to measure the concentration of sugar in the blood of cows, especially in various clinical conditions, including cases of hypoglycemia that are treated with sugar itself, and measuring the concentration of sugar is very important when diagnosing diseases in cows that causes high and low sugar concentrations and due to the ease of use and transportation of the device and its low price and the price of test strips ,compared with kit method, we recommend using it in cow glucose measurement and using it in veterinary medicine.

Keywords **.cow, glucose concentration, glucometer, Accu-chek.**

I.   INTRODUCTION

The health of cows can be assessed based on blood characteristics and their biochemistry. Hematology and its values are an enhanced tool for clinical diagnosis or other diagnostic procedures (1). Glucose is considered a very necessary nutrient in higher organisms where important cells such as neurons, red blood cells and glandular cells depend. Milk is used to obtain energy from glucose and a high level of physiological concentration of glucose in the bloodstream is required (2). Ruminants, especially dairy cows, have a special approach to glucose metabolism due to the enormous demand, by their mammary gland, for glucose at the start of lactation and the permanent change between pregnancy and lactation. Moreover, most glucose is produced by gluconeogenesis using volatile glucose precursors such as, propionate, lactate (3). The concentration of glucose in the blood affects the ovarian function and the menstrual cycle in cows and is a source of energy for the continuation of reproductive performance (4). In addition, cows suffer from uterine infections within the first three weeks after birth due to a decrease in glycogen concentration in polymorphonuclear neutrophils(PMN), which leads to a decrease in their functions and the concentration of glycogen for these cells is related to the concentration of blood glucose (4). Glucose plays an important role in milk production and reproduction, as it takes 72 grams of glucose to

produce 1 kg of milk. Reflux of the uterus after parturation depends on the concentration of glucose in addition to preparing the uterus with carbon to create various compounds such as nucleotides and intrauterine fats (5). Glucose is not only a universal fuel, but it is also a basic fuel for all higher organisms, so it must be permanently available at an adequate level in the bloodstream. The concentration of glucose may change in cases of illness, stress, hunger or nutritional deficiencies (6) Therefore, this study aims to monitoring blood sugar levels from disease and other healthy animal (7) and comparing measurements between the rapid method and the measurement method using the spectrophtometer to determine the compatibility between them in order to support rapid clinical diagnosis and decision-making regarding the possibility of administering intravenous nutrients that contain sugar in its components in addition to sugar being the only treatment for some diseases that occur in cows. It is preferable to use a manual field device to measure the sugar level due to the speed (8) in giving the result, and the values of sugar concentration are affected by the conditions of transportation and storage of blood samples in addition to the low price of the device ACUU-CHEK and the ease of conducting the examination compared to the kit and spectrophotometer, the kits for testing sugar and the long time required to conduct the examination (9).

II. MATERIALS AND METHODS

In this study, venous blood samples were collected from randomly cows living in areas around Nasiriyah and under different conditions and different health conditions 52 blood samples were drawn from the jugular vein using fine syringes and immediately transferred to test tubes, which were numbered, emptied from air and free of anti-clotting substances, and after the clotting occurred, the serum was separated using a centrifuge. The serums were transferred to abendaroves (small tubes) and were frozen to a degree of minus 18 until the testing was carried out, and the Spectrophotometer was adjusted to measure the sugar concentration in the samples according to the method of the producing company (Biomaghreb) for measuring blood glucose concentration. The ACCU-CHEK rapid test device was prepared and the results were read using a drop of blood as soon as it was collected from the vein on the dedicated tape attached to the device, then the tape was placed in its designated place in the device and waiting for the electronic number that expresses the sugar concentration to appear and recorded in a special record prepared to record the results.

The statistical analysis

The statistical analysis of this study analyzed by using (Chi-square) and independent samples T-test. All analyses were performed with statistical Package for the social sciences SPSS for Windows (version 23.0 SPSS Inc, Chicago, 111).

III. RESULTS

Table No. 1 shows the blood glucose results using the Kit and Accu-Chek device methods

No	male calves 1m-year		Male calves 1m-year		Diseased cows 5-9 years		Diseased cows 2-4 years		Healthy cows 5-9 years		Healthy cows 2-4 years	
	Kit	Accu	Kit	Accu	Kit	Accu	Kit	Accu	Kit	Accu	Kit	Accu
1	112	140	72	91	75	93	75	93	61	83	135	169
2	110	141	67	77	88	108	60	63	72	80	106	132
3	50	50	217	271	60	75	70	88	50	98	77	97
4	86	113	54	67	68	85	65	80	72	77	60	74
5	59	96	40	50	87	119	62	76	60	75	62	78
6	27	17	50	61	40	54	64	80	85	110	67	84
7	48	60	81	102	57	73	53	84	52	67	89	127
8	-	-	124	155	25	36	-	-	80	101	75	96
9	-	-	35	53	57	73	-	-	80	100	73	91
10	-	-	-	-	-	-	-	-	63	77	-	-
11	-	-	-	-	-	-	-	-	67	84	-	-
Total	7	7	9	9	9	9	7	7	11	11	9	9
erage	70.28	88.14	74	92.7	61.88	79.55	64.14	80.57	67.45	86.54	82.66	109.33

Table No. 2 shows the statistics results using the Kit and Accu-Chek device methods

Groups/Ages	Test	N	Mean	Sta.deviation	T	Significance
Healthy cows 2-4 years	Accu-chek	9	105.33[a]	31.18	1.72	0.10
	Kit	9	82.66[a]	24.22		
Healthy cows 5-9 years	Accu-chek	11	86.54[a]	13.53	3.56	0.002
	Kit	11	67.45[b]	11.50		
Diseased cows 2-4 years	Accu-chek	7	80.57[a]	9.58	3.65	0.003
	Kit	7	64.14[b]	7.05		
Diseased cows 5-9 years	Accu-chek	9	79.55[a]	25.57	1.61	0.12
	Kit	9	61.88[b]	20.65		
Male calves 1m- 1year	Accu-chek	9	103.0[a]	70.81	0.68	0.5
	Kit	9	82.22[a]	57.11		
Female calves 1m- 1year	Accu-chek	7	88.14[a]	47.38	0.81	0.42
	Kit	7	70.28[a]	32.84		

lV. Discussion

Results were observed with kit method closer to the normal range in all groups, while the results of the Accu-chek device test were higher in three groups. Results also recorded no significant difference at the level of significance P <0.05 in three groups and a significant difference in three other groups (Table 2) as it is observed in the standard error values. However, the rates using the two methods mostly fall within the average sugar concentration 42-75 mg / 100 ml of blood and when it was higher, it is higher in the two methods approximately, and this is a result of the accuracy of the examination in the blood and also a result of the fact that 4 groups of animals used were sick and suffering from high or low blood sugar concentration and some of these cases were very high, as in case No. 3 and 8 in group of male calves (Table No. 1), while the concentration was very low, as in No. 6 in the group of female calves, noting that the two groups of calves had cases of different diseases and consumed different feeds also, and this affected the concentration of sugar. These results similarity with (10). A high increase in the concentration was also observed (Table No. 1) in case No. 2 and 1 in the healthy cows group of 2-4 years old and the decrease in concentration as in case No. 8 and 6 of the sick cows group 5-9 years old. However, the increase and decrease of the values were consistent in kit and Accu-chek methods. Study (11) indicated the possibility of using the Accu-chek device in monitoring sugar concentration in cows, (12) indicated that the device was used in veterinary medicine accurately and approved its use in animal testing, and (14) was allowed to use the device in cows as permitted (16,15). The results of this study were in conformity with what was recommended (17) for the use of the device in sheep and cows. The results also showed a difference in the concentration of sugar in the blood of cows of different ages and health status, and this result is very important when diagnosing and treating diseases, especially in diseases in which pharmaceutical solutions containing High sugar concentrations.

V. Conclusions

Accu-chek (device) can be used to measure the concentration of sugar in the blood of cows, especially in various clinical conditions, including cases of hypoglycemia that are treated with sugar itself, and measuring the concentration of sugar is very important when diagnosing diseases in cows that causes high and low sugar concentrations and due to the ease of use and transportation of the device and its low price and the price of test strips ,compared with kit method, we recommend using it in cow glucose measurement and using it in veterinary medicine.

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