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Effect of Different Levels of Bread Yeast *Saccharomyces cerevisiae* in the Production of Milk and Its Components for Crossbred Holstein Cows (1) Production of Milk and the Components and Quantity of Feed Consumed

Amad Falah Al - Jassem, Muntaha Yacoub Yousef and Mohaman Abbas Abid Al –Mayahi*

Animal production /Agri. College /Univ.of Basrah, Basrah, Iraq

*Corresponding Author E-mail: almuhandsmuhaman99@gmail.com

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ABSTRACT

The study was conducted in the Agricultural Research Station of the Faculty of Agriculture / University of Basrah / Karma Ali site and was used in the experiment Four Holstein Cows Crossbred Were selected from the animal field and the cows were randomly distributed in individual feeding pens Conditions were created in terms of cleanliness of barns and the feed and water that were offered to the cows The experiment included four treatments, four periods and four cows.

1- Control group. Cattle were fed to concentrated feeds consisting of barley (25%), bran (72%), food salt (1%) and vitamins (1%) which were free of yeast.

2. The second treatment. (5 g / kg / day) from yeast (Saccharomyces cerevisiae) to feed material consisting of barley (25%), bran (72%), food salt (1%) and vitamins (1%).

3. The third treatment (10g / kg/ day) from yeast to feed material consisting of barley (25%), bran (72%), food salt (1%), vitamins (1%),

4. The fourth treatment. (15 g / kg / day) concentrated feed consisting of barley (25%), bran (72%), food salt (1%) and vitamins (1%).

The study reached the following:

The addition of yeast to feed material by (5, 10, 15 g / day) resulted in an increase in the daily production ratio which reached (4.28, 4.18, 4.36 kg) respectively compared to control treatment which reached (3.51 kg) And weekly production in the three transactions which amounted to (29.58, 29.34 and 30.54 kg), respectively, compared with the control group of (24.21 kg) respectively. As for the components of milk, yeast supplements did not affect milk fat. However, the addition of (5 g / kg / day) of yeast resulted in an increase in milk protein ratio (4.03) compared to control group (3.26), respectively, resulted in an increase of lactose in milk (5.22) compared to control group (4.68) respectively. The addition also showed significant difference in the ratio of solids which reached (10.25) compared with control group which reached (8.82).

As for the amount of fodder consumed, the percentage of concentrated fodder consumed by adding yeast to feed material increased in the three transactions (5,10,15), respectively, which reached (4.27.4.26.4.46) compared with the control group which reached (3.61), respectively.

**Research based on the thesis of the third researcher*

Key word: *Saccharomyces cerevisiae, Holstein cows Crossbred, Milk production*

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INTRODUCTION

Milk is an integral natural nutrient that contains most of the essential nutrients necessary for life and growth. Cows are the main milk producers among the farm animals in the world, accounting for about 90% of the total production, and cows contribute mainly to agriculture, food and rural development. Products and services such as milk, meat, energy project and organic fertilizer for fertilizers and fuels[8].The main determinant of milk production in most dairy cattle herds is the consumption of feed. Therefore, the breeder should not underestimate the importance of nutrition and the cost of feed constitutes the largest proportion of the total cost of milk production compared with any other factor. Of researchers to improve the nutrition of dairy cows following the modern methods of nutrition and used nutritional supplements such as vitamins and minerals have been used as many other materials as feed additives to raise production efficiency and reproductive or weight increases as used Many of the late industrial waste in feeding cow's milk such as corn cobs and wheat straw, so the cheap price and contain a high proportion of fiber and reduce environmental pollution[15,16].Currently, researchers and animal breeders have sought to find new ways to improve animal health and performance by adding natural growth-enhancing alternatives that produce similar effects on animal health and production[3].

One of these methods is the introduction of yeast in nutrition, especially bread yeast Saccharomyces cerevisiae, which was used to feed dairy cattle and other animals because of their beneficial effects on the production of animals widely as additive in feed ruminants, where this yeast can act as a vital boost because it has a key role known In improving the rumen environment[4,5,11,29].On the other hand he found Nocek *et al*[18]., Nocek and Kautz[17], Otzel *et al*[20]., the addition of yeast to Holstein dairy cattle improved the amount of dry matter consumed and increased the production of milk and improved its components by increasing the appetite of animals and improve the state of health through its effects on rumen fermentation and help in metabolic processes, especially nitrogen metabolism when added to the diet[21,22].Therefore, the present study aimed at finding out the effect of adding different levels of bread yeast to the damaged ballast and studying the effect of:

1- Milk production daily and weekly

2 - Components of milk, which included the proportion of fat, the proportion of protein, the proportion of solids and lactose

3 - the amount of daily feed consumed.

MATERIALS AND METHODS

The study plan

The study was conducted at the agricultural research station affiliated to the Faculty of Agriculture / University of Basrah. The actual experiment began on 22/9/2016 until 14/12/2016 and preceded by a preliminary period of 14 days to adapt the animals to the experimental conditions.

Design Experience

The use of design of the Latin square (4×4×4) which includes the selection (4 cow) of the animal field Producer of milk and four levels of yeast (0 ,5 ,10 ,15 g /kg) the concentrate diet and four trial periods per period (21) days, preceded by a preliminary period of duration (14 days) To acclimate animals to experimental conditions as in the following scheme.

Cow Number	The first period(21d)	Second period(21d)	Third period(21d)	Fourth period(21d)
1	Do not add yeast (0)	5g	10g	15g
2	5g	10g	15g	Do not add yeast (0)
3	10g	15g	Do not add yeast (0)	5g
4	15g	Do not add yeast (0)	5g	10g

Management of herd

Shelter animals

The animals were housed in shaded parlors, and the cows were randomly distributed in special experimentation with dimensions ranging from 3 m wide and 4 m long with tight doors feeding the cows individually according to the experimentation treatments. Each cutter was equipped with a feeder and water drink for each animal. For animals for the duration of the experiment for 84 days

The cows of the experiment were free from epidemics and infectious diseases and were subject to veterinary examination and care by veterinary doctors responsible for the care of the animal field.

Feeding systems

The feed material for each animal fed concentrated feeds plus Saccharomyces cerevisiae yeast according to the animal-specific treatments was given to the cows with 1Kg of concentrate diet per 1Kg of milk.

The feeding cows in a single where it was provided the meal Morning at (8 am) and given the evening meal at the time (4 pm) and placed fodder in Mangers for each cow, but for the feed filler has been used reeds green feed cows experience throughout the period. This is done by weighing a certain quantity of reed and is provided in the morning. The remaining fodder is weighed the next day and recorded. As for the drinking water, it was provided to the animals in plastic tubs and free of charge. Daily docks

Table 1: Chemical composition of the constituent nutrients

Feeding material	Concentrated feed		
	Barley	Wheat bran	urea
Dry matter	90.32	90.42	100
Curde protein	10.50	13.50	288
Ether Extract	2.12	4.61	
Raw fiber	6.11	10.71	
Carbohydrates dissolved	68.52	53.83	
ash	2.99	4.35	

*** Calculated by Khawaja[12]**

Table 2: Chemical composition of concentrated fodder

Dry matter	87.68
curde protein	15.23
Ether Extract	3.83
Raw fiber	9.24
Ash	3.87
Carbohydrates dissolved	55.51
Energy actress Gul / kg	11.25

*** Calculated by Khawaja[12]**

* The energy represented by experimental experiments according to the Scottish Ministry of Agriculture (Maff., 1975):

Energy represented by Gul / kg dry matter = 0.12 * crude protein + 0.31 * ether extract + 0.05 * raw fiber + 0.14 * dissolved carbohydrates.

Methods of sampling during the experiment

The milk samples were collected from the morning ring once. The samples were taken by 200 ml per sample at 7:30 am in a special bottle to collect the samples at each end of each cow. Samples were taken to the laboratory for analysis and identification of milk components. Samples by a German (Lacto Flash) device in the laboratories of the Faculty of Agriculture, University of Wasit,

through which the proportion of fat, protein and the proportion of solids and lactose.

Statistical analysis

The data were statistically analyzed according to SPSS[27] (2012). The design of the Latin square (4 × 4) was used with 4 cows and 4 levels of yeast (0,5,10,15 g / kg) and 4 periods Experimental.

RESULTS AND DISCUSSION

Production of milk daily and weekly

Table (3) showed significant differences (P <0.05) in daily milk production in the second, third, and fourth treatment (4.28, 4.18, 4.36 kg), respectively, compared with control treatment (3.51 kg) respectively**.**As for the weekly milk production, the second, third and fourth treatments were also higher (29.58, 29.34 and 30.54 kg) respectively compared to control treatment (24.21 kg) respectively. The reason for the daily and weekly increase in the amount of milk may be due to the addition of yeast to the concentrated feed to the cows, which increased the palatability of the feed material and stimulated the cellulose bacteria, thus increasing the rumen fermentation and preventing high acidity of the rumen by keeping lactic acid and increasing the use of lactic acid from Before some bacteria and thus improved production[2,23,25].This result is in line with what Kholif *et al*[13]., pointed out. The addition of yeast (10.15 g) resulted in a significant change in the production of milk by (20%) in addition to improving the coefficient of nutrients and milk quality.Hossain *et al*[9]., tested the bovine Holstein frisian cows when yeast (*Saccharomyces cerevisiae*) (15 g / head / day) had significant differences (P <0.05) in milk production.As Shreedhar et al[26]. (2016) showed in his experience, when Friesian cows were fed at different levels of *Saccharomyces cerevisiae* and *Lactobacillus supergenes* (10, 15, 20 g / head / day) respectively, he observed high milk production (8.31, 8.26, 8.48 liters / day) to (8.97, 9.64, 9.68 liters / day) In the three consecutive transactions compared to the control transaction (8.45 and 8.57 liters / day), and treatment (15 g /head / day) exceeded all experimental treatments.

Table 3: Average daily and weekly milk production of experimental coefficients ± standard error

Treatment	Daily milk production	weekly milk production
Do not add yeast	0.14 ± 3.51 b	2.53 ± 24.21 b
5 g yeast / kg concentrated fodder	0.12 ± 4.28 a	1.88 ± 29.58 a
10 g yeast / kg concentrated fodder	0.13 ± 4.18 a	2.27 ± 29.34 a
15 g yeast / kg concentrated fodder	0.15 ± 4.36 a	2.57 ± 30.54 a

(*) The averages with different letters in the same position vertically differ significantly at (P <0.05)

Fat ratio and protein content

Table (4) shows significant differences (P <0.05) in the average milk protein ratio. The second treatment (4.03) was superior to the control treatment and the third and fourth treatments respectively (3.26, 3.24, 3.12). The reason for the increase in the proportion of milk protein to feed the animals on the feed materials, which contain a high proportion of carbohydrates and carbohydrates, which in turn lead to increase the growth of bacteria in the stomach and intestines and also lead to increase the milk content of the protein, where the yeast contains carbohydrates by (35 -40) and protein (46-52)[24].

Yeast is also used to increase the digestion of fibers and nutrients that supply the lactic gland instead of storing it as a reserve in the body. In addition, increased protein production of the protein gland may be due to increased microbial protein synthesis in metabolic processes in animal intestines[13].Maamouri *et al*[14]., in a study of 8 Holstein Frisian cows fed yeast (2.5 *10^{10}

CFU) tended to increase the level of milk protein from (38.7 - 41.7 g / day) to the cow by a significant difference (P <0.05) compared to the control group.Hossain *et al*[9]., when Holstein Friesian cows fed *Saccharomyces cerevisiae* yeast (15 g / head / day) resulted in significant improvement of (P <0.05) in milk protein content and Nour El-Din[19], (2015) when the Holstein cows fed two types of yeast (TY) and the second (GY) (3.75 and 15 g / head / day) respectively for TY and GY, which was mixed with concentrated feed, (P <0.05) in the treatment groups compared with the control group.As for the fat ratio, table (4) shows that milk fat was not affected when feeding the yeast, no significant differences were observed. Fat ratio in the four treatments was (3.41.4.33.3.54.3.28) respectively.

Table 4: Mean fat ratio and protein ratio for experimental treatments ± standard error

Treatment	protein ratio	fat ratio
Do not add yeast	0.20 ± 3.26 b	0.60 ± 3.41
5 g yeast / kg concentrated fodder	0.35 ± 4.03 a	0.93 ± 4.33
10 g yeast / kg concentrated fodder	0.09 ± 3.24 b	0.25 ± 3.54
15 g yeast / kg concentrated fodder	0.02 ± 3.12 b	0.89 ± 3.28

(*) The averages with different letters in the same position vertically differ significantly at (P <0.05).
(*) Meanings that did not have different characters mean no significant differences.

Ratio of solids and lactose

As for table (5), which is related to the ratio of solids, the second treatment, which amounted to (10.25) on the treatment of control and fourth treatment, which amounted to (8.82, 8.48) morally, respectively, but not significantly with the third treatment, which amounted to (9.00). This may be due to the addition of yeast, which improves the components of cow's milk or may be related to an increase in milk protein and fat in the second treatment on other treatments. This is due to the role of yeast *Saccharomyces cerevisiae* in changing the fermentation patterns in the rumen for the balance of energy and production of animals fed on Yeast[1].Hossain *et al*[9]., showed that cows fed yeast (*Saccharomyces cerevisiae* (15 g / head / day) showed significant improvement (P <0.05) in milk protein content and solids in milk.Nour El-Din[19], find in a study of the effect of TY and GY on the production of milk and its components in the Holstein cows by (3.75 and 15 g / day for the cow) respectively, to (TY) and (GY). The additives increased the solids ratio and showed significant differences (P <0.05) in the treatment groups compared to the control group. As for lactose, it was found in Table (5) that the second treatment, which reached (5.22) on the control treatment, third and fourth, which amounted to (4.68, 4.70, 4.69), respectively. This may be due to the fact that yeast - fed cows have led to changes in rumen patterns, as well as high energy balance and production, as a result of regulating the pH of the rumen and thus stabilizing the effect of the cellulose digestion bacteria, which increases fiber metabolism and regulates the function of the body. On a regular basis and thus more production achieved by increasing the production of milk and its components, which represented the proportion of protein and the proportion of solids and the proportion of lactose. This study is consistent with Szucs *et al*[28]., in his study when feeding the bread yeast *Saccharomyces cerevisiae* by (5 g / head / day) and (12 g / day dissolved in 500 ml of water) led to an increase in the lactose of milk content and reduced the number of somatic cells difference significantly (P <0.05) and the level of lactose and glucose levels increased in the transactions group compared to a set of control.

Table 5: Mean ratio of solids and lactose to experimental coefficients ± standard error

Treatment	ratio of solids	ratio of lactose
Do not add yeast	0.53 ± 8.82 b	0.16 ± 4.68 c
5 g yeast / kg concentrated fodder	0.87 ± 10.25 a	0.13 ± 5.22 a
10 g yeast / kg concentrated fodder	0.48 ± 9.00 ab	0.07 ± 4.70 bc
15 g yeast / kg concentrated fodder	0.08 ± 8.48 b	0.03 ± 4.69 c

(*) The averages with different letters in the same position vertically differ significantly at (P <0.05).

Effect of yeast on the amount of feed consumed

Table (6) shows the average amount of feed consumed. The table shows the increase in the consumption of feed material and the increase in production. This positive effect may result from improved fiber density and change of acetate to propionate and increase the flow of microbial protein to Duodenum[2]. The beneficial effect of yeast on fiber regimens is partly responsible for increased intake of dry matter and increased consumption of fodder[10].Or the increase in the processes may be due to stability in the environment of rumen and the degree of acidity of rumen and remove oxygen into the rumen and stability of the rumen and the maintenance of microbial balance within the channel and the mechanism of yeast work is to stimulate the bacteria consuming lactic acid and thus the lack of production of this acid and stability of the pH of the crash Provide a suitable environment for the growth of microorganisms in the rumen, especially the cellulosic bacteria and other microorganisms that help to grow better in microbial biomass and improve the process of regulation and thus fiber fragmentation and increase the utilization of feed Thus gaining productivity[6,7]. The table also shows (6) equal to the amount of green fodder (reeds) submitted to the cows, and this is due to its use as feed, where Plump and distributed a fixed amount for each cow during the trial period offered daily, according to the remaining on the second day.

Table 6: shows the average amount of feed consumed in experimental transactions ± standard error

Treatment	concentrated fodder	Green fodder (reeds)
Do not add yeast	0.14 ± 3.61 b	2.21
5 g yeast / kg concentrated fodder	0.13 ± 4.27 a	2.23
10 g yeast / kg concentrated fodder	0.13 ± 4.27 a	2.27
15 g yeast / kg concentrated fodder	0.14 ± 4.46 a	2.22

(*) The averages with different letters in the same position vertically differ significantly at (P <0.05).

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