

EFFECT OF INTRODUCING DRIED BREWERS GRAINS IN DIETS OF DAIRY COWS ON MILK PRODUCTION AND ITS COMPOSITION

Ali A. AL-Talib Abdul-Nassir Th. AL-Khashab Mozhir K. Almahdawi
College of Agriculture and Forestry/Mosul University

Abstract:

In order to limited and identify the locally optimal of milk production during the first fourth months of the productive season of Friesian cows. This experiment was conducted on four dairy Friesian cows which was in fourth lactation season. The dairy cows were equal in initial live weights at the beginning of the experiment. These cows were randomly assigned to feed on four diets that were iso caloric and iso nitrogen, which differed in level of dried brewers grains (0, 10, 20, 30%) in dairy cows diets over 4 intervals (28 days each interval) through experiment period. Through the experiment period were included every cow was submitted four rations at the end of experiment. The statistical analysis results were appeared highly significant differences ($p \leq 0.01$) in average amounts of concentrate fodder intake, total feed intake, protein intake and feed conversion between both first, second treatments (0, 10% dried brewers grain) as compared to third and fourth treatments (20, 30% dried brewers grain). It is found highly significant differences ($p \leq 0.01$) among four treatments on amount of metabolize energy consumes and daily milk yield. Also, the results indicated that there were highly significant differences ($p \leq 0.01$) between second, third than first, fourth treatments on average percentage of milk protein. As well as the results showed significant differences ($p \leq 0.05$) between first treatment than fourth treatment on average percentages of moisture and total solids. Also, it was found significant differences ($p \leq 0.05$) in average percentages of milk fat, ash between first treatment when compared to other treatments. We conclude from the results of this study that there were significantly improved in amount of daily milk product and its composition proportions during four intervals by increased levels of brewers grains residues (0, 10, 20, 30%) it may be due to improved feed conversion trait which were 1.860, 1.530, 1.310, 1.295 of four treatments respectively.

Key words: dried brewers grains, milk yield, milk protein, milk fat .

تأثير مخلفات معاملة البيرة المجففة في علائق أبقار الحليب على إنتاج الحليب ومكوناته

علي عبد الغني الطالب عبدالناصر ذنون الخشاب مزهر كاظم المهداوي

الخلاصة :

بهدف تحديد ومعرفة أعلى إنتاج محلي للحليب خلال الأشهر الأربعة الأولى من الموسم الإنتاجي لإدرار الحليب في أبقار الفريزيان الحلوبة تحت الظروف المحلية. استخدمت في هذه التجربة أربعة أبقار فريزيان حلوبة في موسمها الإنتاجي الرابع. وكانت الأبقار متقاربة تقريبا في معدلات أوزان الجسم الحي وإنتاج الحليب في بداية التجربة. ووزعت هذه الأبقار عشوائيا إلى أربع معاملات تغذوية ولأربع فترات مدة كل منها 28 يوما بطريقة تصميم المربع اللاتيني. وغذيت هذه الأبقار على أربعة علائق متماثلة بمستوى البروتين الخام والطاقة الممتلئة ولكن اختلفت في مستوى مخلفات معاملة البيرة المجففة حيث أضيفت بنسب 0 ، 10 ، 20 ، 30% في علائق تغذية أبقار الحليب. واستمرت فترة التغذية على هذه العلائق المركزة بفتراتها الأربعة خلال مدة التجربة بحيث تناولت كل بقرة في نهاية التجربة العلائق الأربعة. وتم أخذ البيانات المتعلقة بالأداء الإنتاجي وكميات إنتاج الحليب اليومي ونسب مكوناته لكل بقرة في المعاملات الأربع خلال فترات التجربة .

أشارت النتائج بوجود فروقات عالية المعنوية ($p \leq 0.01$) في متوسطات الكميات المتناولة من العلف المركز والعلف الكلي والبروتين ومعدلات التحويل الغذائي بين كلا المعاملتين الأولى والثانية (0 ، 10% مخلفات معاملة البيرة المجففة) عن المعاملتين الثالثة والرابعة (20 ، 30% مخلفات معاملة البيرة الجافة) وبين المعاملات الأربعة في متوسطات صفتي كمية الطاقة الممتلئة المستهلكة وكميات إنتاج الحليب اليومي وما بين كلا المعاملتين الثانية والثالثة قياسا بالمعاملتين الأولى والرابعة في معدلات صفة بروتين الحليب. كما أشارت النتائج إلى وجود فروقات معنوية ($p \leq 0.05$) بين المعاملة الأولى عن المعاملة الرابعة في متوسطات نسبي الرطوبة والمواد الصلبة الكلية في حليب الأبقار. كذلك وجد فروقات معنوية ($p \leq 0.05$) بين المعاملة الأولى عن المعاملات الثلاث الأخيرة في متوسطات نسبي دهن الحليب والرماد. يستنتج من نتائج هذه الدراسة وجود تحسن معنوي في كميات الحليب المنتج اليومي ونسب مكوناته خلال الفترات الأربعة عند زيادة نسب مخلفات معاملة البيرة المجففة (0 ، 10 ، 20 ، 30%) في علائق تغذية أبقار الحليب نتيجة التحسن المعنوي في كفاءة التحويل الغذائي والتي بلغت 1.303 ، 1.530 ، 1.860 ، 1.295 كغم علف متناول/كغم حليب منتج للمعاملات الأربعة على التوالي .

الكلمات المفتاحية: مخلفات معاملة البيرة المجففة ، إنتاج الحليب ، بروتين الحليب ، دهن الحليب ، الفريزيان .

Introduction

In recent years, the demand was increased for animal protein sources such as milk ,other dairy products and meat from sheep and calves as a result rendering the great aspects of health, cultural and economic development. As well as the prices of feedstuffs continues to rise, so it has become necessary to choose different sources of non protein nitrogen and locally available at cost suitable, in order to achieve the goal of reducing the feeding costs which

constitutes about 70% of the cost of production (Pond and Mishra 1981) and so as to increase productive performance of local animals must conduct studies ongoing about number of animals livestock development and increase productivity through improving genotypes and proper nutrition, therefore the farmers wants to obtain bigger amount of milk with high fat percent during the productive season. The dairy cows nutrition is a most important factor in lactating cattle production projects

because of its direct impact and quick on the amount of milk product and its components, especially in beginning of the productive season (Taha and Ferhan 1980). The most important nutrients, which must be available in sufficient quantity in diets of high producing dairy cows is crude protein and mostly from plant sources such as meals because its deficiency in lactating cows diets may lead to a reduction in daily milk yield (Taha et al 1984). protein sources is a good quality should be used in diets of dairy cattle to reach the crude protein with a level no less than 12% (NRC 2001).As various types of meals is the most important plant sources of high biological value, but the highly prices of these meals and its imported from other countries that leads to increase cost of feeding resulting decrease in profits of milking cows breeding projects. Therefore, many attempts were carried out (AL-Khazrage 1983, Shamoan and Salih 1990) to insert unconventional protein sources substituted by using meals such as brewers grains that contained 23-26% crude protein and its utilization in animal nutrition. Brewery byproducts are residues of grains that are used to produce beer. The residue can be marketed directly as wet brewers grain (WBG) or as dried brewers grain (DBG). Brewers grain derived mainly from barley fermented to produce beer has about 23% C.P and is high in digestible fiber. Brewers grain are suitable for ruminants, particularly in dairy cows, to balance intake of large amounts of high starch diets. Davis et al (1983) noted significant increase in

average consumption of dry matter intake and milk fat percent and concentration of acetic acid in rumen liquid of dairy cows with increasing proportion of dried brewers grains in their diets as compared to control group when they used different levels of dried brewers grains (0, 10, 20, 30, 40%) by replaced with yellow corn in milking cows rations. Polan et al (1985) was found significant differences in amount of milk production and its content of dry matter but no significant differences in levels of protein and milk fat when they used four diets containing soybean meal in the first diet (control diet) and wet or dried brewers grains in the last three diets of Holstein cows. This conclusion was supported by Belibasakis and Tsirgogianni (1996) who found significant increase in amount of milk production and milk components (milk fat, Solids Non Fat) except that of milk sugar (lactose) when they used different levels of dried brewers grains in feeding of dairy Friesian cows. In another study Younker et al (1998) had found significant decrease in amount of dry matter consumed by dairy cows when they fed different levels of dried brewers grains in diets. Valentine and Wickes (2003) found a significant increase in amounts of milk yield and percents of milk protein and solids non fat when they fed on different levels of dried brewers grains (2.4, 4.8, 7.2) kg in experimental diets as comparison to control group and also they did not found any significant effect on milk composition at 15% dried brewers grains in dairy cows rations. On the other

hand, West (2002) noted no significant effect of dried brewers grains on milk yield, milk fat, solids non fat percentages among three treatments including 0, 15, 30% of dried brewers grains. While Hoffman and Armentano (1988) fed diets containing 21.5% DBG and 23.5% WBG and observed no change in feed intake, milk yield, and milk composition of cows in early lactation. Also, Dhiman et al (2003) who found no significant effect of brewers grains on milk yield and its composition when they were using dried and wet brewers grain as protein source in diet of lactating cows.

The objective of this research was firstly to study the possibility of utilize dried brewers grains as an alternative of protein sources to fed lactating cows and secondly to know the effect of its levels on productive performance and milk composition of dairy Frisian cows.

Materials and methods:

1- Animals and Plan of Experiment :

Four dairy Frisian cows with convergent live body weight and milk yield were intact prior to the start of the experiment. These cows were put under surveillance and periodic follow-up by giving pay diet for the adaptation period for two weeks before starting implementation of the experiment. Cows were dosage of textured Rafoxanide at the beginning of the experiment at twice and the period between first dose and second was about 21 days and they were injected with textured Ivermectin to kill internal parasites. Another beside those cows were put in barns single dimensions 4×4 is equipped with

Bmaalv and Fountains ground and then cows were randomly distributed into four periods of trial, each 28 days (table 1). At the second, third and fourth periods diets were switched among themselves so that each cow fed four diets at the end of experiment by latin square method of experiment (table 1).

2- Feeding system: Cows were fed on concentrates diet (table 1) at level of 2% of the live weight to meet the maintenance requirements in addition to 1 kg of concentrate feed/2.5 kg milk produces to meet requirements of milk production (NRC 2001). These intensive diets were offered twice day the first in the morning at 5.00 and the second in the evening at 15.00 during milking periods, either roughage feed such as wheat straw was offered to the animal in crib barn for ad libitum, pure water was available to the animals down throughout the duration of the experiment.

3-Weights of measurement system:

These cows were weigh at starting of experiment period, as well as at the end of each feeding intervals using electronic balance with degree of sensitivity of about 0.5 kg and collecting data with amount of concentrate feed intake, total feed intake, feed conversion efficiency and amount of daily milk production during four intervals of the trial period were recorded.

4- Measurement of milk system : The amount of milk was measured at the beginning and the end of each interval of four treatments with two consecutive days and the process is done after isolate births from mothers and is unloaded mothers udder on the first day, and the

next morning is milking cows manually and repeats milking again so that they were unarmmed 24-hour period between birth isolate and ring evening for cows and practical replicated in the second day for the purpose of obtaining two models of milk for chemical analysis, amount of daily milk yield was calculated from cows by using following equation:-

Total amount of daily milk (kg): amount of milk in the ring morning (kg) + amount of milk in the ring evening (kg). (Saleh 2008) .

5-Sampling system: equal amounts of milk samples were taken from each cow by manual milking, morning and evening with the same size were mixed together to obtain a representative samples in order to overcome the problem of disagreement ratios components of milk between the ring morning and evening ring. The process were repetit again on the second day for two models of milk for chemical analysis, and milk samples were carried to chemical analysis device (Ekomilk) to estimate the proportions of moisture, crude protein, ether extract, lactose sugar, pH, ash solids non-fat (SNF) and total solids.

6- Statistical analysis: Statistical analysis of data during feeding intervals on four diets in this experiment obtained were done according to the Latin Square

Design (AL-Rawi and Khalaf-Allah, 2000) to determine the impact of the dried brewers grains levels in diets on milk production and its composition of dairy Frisian cows. Using mathematical model the following :-

$$Y_{ij(k)} = \mu + p_i + y_j + t_k + e_{ij(k)}$$

Y_{ij} =value of observation which is beyond to treatment (k) that found in row (i) and column (j) .

μ =The average of all observations .

p_i = effect value of the row (i) which is represents a feeding periods .

y_j = effect value of the column (j) which is represents animals groups .

t_k = effect value of the treatment (k) which is represents a level of dried brewers grains in the ration of dairy Frisian cows .

$e_{ij(k)}$ =random experimental error of the unit test, which is distributed normal and independent with an average of zero and the contrast is equal to $\sigma^2 e$. Comparison between the means were tested using Duncan test (Duncan 1955) at the level of probability of 5% or 1% statistical analysis system (SAS-Anonymous, 2002) was used .

Table (1):Diets components and its chemical analysis that used in dairy Frisian cows rations .

items	First treatment (control diet)	Second treatment	Third treatment	Fourth treatment
1-dried brewers grains (%) *	0	10	20	30
2-soybean meal (%) .	9	8	7	6
3-barley (%) .	56	50	45	40
4-wheat bran (%) .	33	30	26	22
5-limestone (%) .	1	1	1	1
6-salts (%) .	1	1	1	1
chemical analysis				
1-dry matter (%) .	95.96	95.68	95.47	95.27
2-crude protein (%) .	15.70	15.58	15.48	15.37
3-ether extract (%) .	2.50	2.96	3.39	3.81
4-crude fiber (%) .	8.39	9.74	11.06	12.38
5-ash (%) .	4.74	4.54	4.30	4.08
6-Metabolize Energy(M_{cal}/kg) .	2.699	2.683	2.664	2.644

chemical analysis of the four diets was calculated according to Al-Khawaja et al (1978).

* Metabolize Energy of dried brewers grains was calculated according by MAFF (1975).

Results and discussion :

Results obtained in this experiment were as follows :

1- Productive performance :

Results of productive performance were shown in table (2) as indicate weights of milking cows of the Frisian were approximated at the beginning and end of the experiment period .The initial live weight of these cows were 498, 491, 509, 520 kg respectively in four treatments at the beginning of experiment and the final weight of these cows were 503, 497 , 516, 528 kg at the end of experiment of four treatments respectively.The average of weight gains of these cows were slightly with ranges from 5-8 kg at the end of experiment period.Results showed

that experimental groups have addressed intensive diets shown in table (1) a manner of free feeding reduce saturation as explained in a way of work.The statistical analysis showed highly significantly differences ($p \leq 0.01$) between both first,second than third and fourth treatments in amounts of concentrate fodder intake,total feed intake and protein intake.The amounts of concentrate feed intake were 13.560,14.409,16.931,17.280 kg/day,total feed intake were 17.060,17.910,19.423,20.780 kg/day and amount of protein intake were 2.133,2.248,2.468,2.658 kg/day of four treatments respectively. These results (table 2) showed significantly

improvement in amount of concentrate feed intake with increasing levels of dried brewers grains in feeding of dairy cows. This significant improve in concentrate feed intake is perhaps is due to the variation in level of production of daily milk, as well as a slight difference in growth of these cows and palatability of the experimental diets that containing (10, 20, 30% dried brewers grains), which led to improvement in growth of body cows at the end of experiment period. As for feed conversion and Metabolize Energy intake the statistical analysis indicated highly significantly differences ($p \leq 0.01$) among treatments. The feed conversion were 1.860, 1.530, 1.310, 1.295 kg of feed intake/kg of milk yield and Metabolize Energy intake were 36.10, 38.66, 42.51, 45.69 kg/M_{cal} of four treatments respectively. The quantities of daily provided for rations were covering nutrient requirements for maintenance and milk production of these cows (NRC 1975). It is clear from results shown in table (2) that there is noticeable improvement in productive performance and body weight gain of cattle that consumed experimental diets which containing (10, 20, 30% dried brewers grains) as compared to that control diet which have no dried brewers grains, and this possibly due to increasing levels of undegradable protein (UDP) for experimental diets contained dried brewers grains according to N.R.C. (2001) was rate of degradability protein of brewers grains is 47.5% which is higher than that rumen degradable protein 35% (RDP) in the control group (SBM) had no dried brewers grains

which provides a positive opportunity by reducing the digestion speed of starch (Kassem 2002) and lead it to raise the pH value of rumen liquid to the top of the critical point (pH=6) and this improves of the rumen environment in experimental animals which is higher than the proportion of protein dissolved conditions which is reflected positively in amount of microbial protein formed in the rumen (ARC, 1984) is due to the presence of brewers grains as a protein source in diets of dairy cows and shows its effect evident on increasing amount of amino acids absorbed from the intestines and thus occurs a marked improvement in increasing utilization efficiency of food from these cows that consumed diets containing dried brewers grains and this means an improvement on performance and its production of animal (Mould et al 1999, Kassem 2002). Regarding feed conversion ratio (table 2) cows were consumed third (20% dried brewers grains) and fourth (30% dried brewers grains) rations was the most efficient as compared to that consuming the first diet (0% dried brewers grains) and the second (10% dried brewers grains) rations. The value of feed conversion ratios were 1.860, 1.530, 1.310, 1.295 kg feed consume/kg milk product of four treatments respectively. This results was agree with what observed Davis et al (1983) who found significant improvement in dry matter consumption and weight gains in milking cows which consume different levels of dried brewers grains when compared to the control group. When they used (0, 10,

20, 30, 40 % dried brewers grains) as substitute for crushed corn, SBM of dairy cows rations and agreed with those obtained by Polan et al (1985) who noted positive significant improvement in rate of dry matter consumption of Holstein cows that consumed dried brewers grains group as compared to other cows group which consume control diet and another group consumed soybean meal. Ojowi et al (1997) reported that feeding wet brewers grains improved dry matter intake and feed conversion ratio between three nutrient treatments which deals with control ration (first treatment), wet brewers grains ration in second treatment and distilled corn ration in third treatment of feeding Aberdeen Angus cattle. So as these results was agree with results of Younker et al (1998) who found a significant differences in amount of dry matter intake for dried brewers grains by Holsteins cows group when compared to control group when used different levels of dried brewers grains as instead of concentrate fodder protein. As well as conform these results was agree of Kaset (2000), who found a marked significant improvement in amount of dry matter consumed of dairy Friesian cows when ingested ratios 10 and 20% of dried brewers grains as compared control group had empty of dried brewers grains. Also these results was agree with results of Firkins et al (2002) who noted significant improved in amount of dry matter intake which contained different levels (low, medium, high) of dried brewers grains in milking cows rations when compared to control group of dairy Holstein cow. In contrast

these results was not agree with results of Dhiman et.al. (2003) who found no significant differences on amounts of dry matter intake (DMI), net energy for lactation (NE_L) and feed conversion among treatments when they were using dried and wet brewers grain as protein source in diet of Holstein- Friesian dairy cows. Also, Mahnken (2010), who found calculation differences very slight among treatments in amount of dry matter consumed When they use dried brewers grains at rates 0, 12, 18, 24% in the dairy cows rations.

2- Milk yield :

Results shown (tables 3, figure1) indicated that there were highly significant differences ($p \leq 0.01$) in rates of milk yield between four treatments of the milking Friesian cows. When Friesian cows were feeding on different proportions of dried brewers grains (0,10,20,30%) .Milk yield were rates 9.348,11.797,14.927,16.060 kg of four treatments respectively (table 3,figure1). From notes of results above were found significantly increase in amount of milk product from those cows by using different levels of dried brewers grains during four intervals of the milk yield season (figure 1), it is due to possibly efficiency increase of utilization for amount of dry matter intake of diets so as these cows consuming dried brewers grains were received higher amount of undegradable protein escaping rumen and then it provides a positive opportunity by reducing the digestion speed of starch (Kassem 2002) and leads to raise the pH value in liquid rumen to the top of point critical (pH=6) and thus improves rumen

environment conditions which is reflected to increase in amount of formed microbial protein in rumen of dairy cows that consumed dried brewers grains and was led to increase speed flow of microbial protein gut (ARC , 1984) and reaching duodenum leading to increase amount of amino acids absorbed via small intestine and thus shown significantly improved increase in amount of milk product from these cows (Mould et al 1999, West 2002, Kassem 2002). This results was agreed with Belibasakis and Tsirgogianni (1996) who found significant increase in amount of daily milk product of dairy Frisian cattle were consumed dried brewers grains in diets as compared control group. Also this results was agree with results of Kaset (2000) who noted a significant difference in daily amount of milk production between treatment which contained 10% dried brewers grains than other treatments (20,30% dried brewers grains) of feeding Holstein cows. While the results of this study was inconsistent

was not agree with results of Dhiman et.al. (2003) who found no significant differences on daily milk yield among treatments when they were using dried and wet brewers grain as protein source in diet of Holstein- Frisian dairy cows.

Also, this results was not agree with Firkins et al (2002) who did not find any significant effect of level of wet brewers grains in rate of this trait among four diets nutritional which was different levels of wet brewers grains to feed dairy Holstein cows when they used different rates of wet brewers grains (0,8.65,17.29,25.94%) of milking Holstein diets. As well as the results of this study was not agree with Mahnken (2010), who did not found significant differences in this trait among treatments who was used different levels of wet brewers grains (0,12,18,24%) which was replace partially and completely by maize silage in the diets of dairy Frisian cows

Table (2): Effect of using different levels of dried brewers grains in diet on productive performance of dairy Frisian cows.

Traits	First treatment (0% dried brewers grains)	Second treatment (10 % dried brewers grains)	Third treatment (20% dried brewers grains)	Fourth treatment (30 % dried brewers grains)
1- Initial weight (Kg) :	498	491	509	520
2- Final weight (Kg):	503	497	516	528
3- Concentrate feed intake (kg) : **	13.560 ± 0.43 C	14.409 ± 0.45 C	15.931 ± 0.84 B	17.280 ± 0.17 A
4- Roughage feed (straw) intake (kg) :	3.500	3.500	3.500	3.500
5- Total feed intake (kg) : **	17.060 ± 0.43 C	17.910 ± 0.45 C	19.423 ± 0.84 B	20.780 ± 0.17 A
6- Feed conversion (kg of feed intake/kg of milk Yield) : **	1.860 ± 0.17 A	1.530 ± 0.11 B	1.310 ± 0.07 C	1.295 ± 0.02 C
7- Protein intake (kg) : **	2.133 ± 0.07 C	2.248 ± 0.07 C	2.468 ± 0.13 B	2.658 ± 0.03 A
8- Metabolize Energy (kg/M _{cal}) : **	36.10 ± 1.26 D	38.66 ± 1.22 C	42.51 ± 2.23 B	45.69 ± 0.45 A

The trait which carrying averages with different letters horizontally indicates highly significant differences at probability 0.01 .

t1: 1st treatment (0% dried brewers grains)
t2: 2nd treatment (10% dried brewers grains)
t3: 3th treatment (20% dried brewers grains)
t4: 4th treatment (30% dried brewers grains)

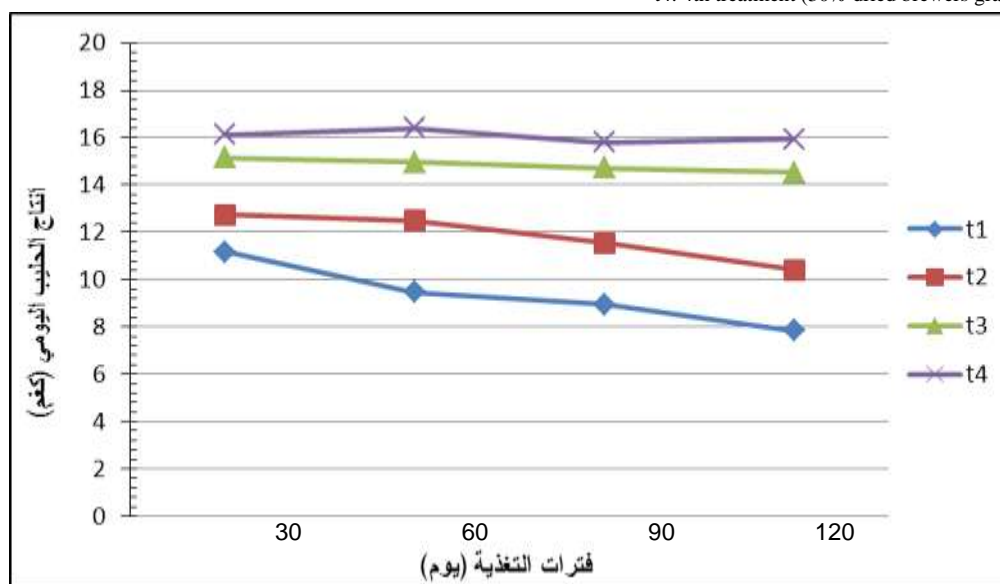


Figure (1): influence of different levels of dried brewers grains on milk yield of lactation cows.

3-

Milk composition :

Results presented in tables(3) indicated that there were significantly differences ($p \leq 0.05$) between first treatment (0% dried brewers grain) than fourth treatment (30% dried brewers grain) on percentage rates of moisture and total solids and also we found significantly differences ($p \leq 0.05$) between first treatment (control diet) when compared to last three treatments (10,20,30% dried brewers grain) on milk fat and ash in feeding of dairy cows. While the milk protein trait (table 3) the statistical analysis revealed that there were a highly significantly differences ($p \leq 0.01$) between both second,third treatments as compared to the first and fourth treatments, when was used different

levels of dried brewers grains as protein source instead of partially and completely of level of protein ration since a long four intervals of feeding period. The averages percentages of moisture were 88.56,87.83,87.74,87.27% and ash were 0.64,0.77,0.81,0.87% and crude protein were 2.98,3.17,3.22,3.40% and milk fat were 3.14,3.69,3.78,4.03% and total solids were 11.44,12.17,12.26,12.73% of four treatments respectively. As about for pH milk, lactose sugar, solid non fats the statistical analysis has confirmed showed no significant differences among treatments on averages of their traits above (table 3). The average rates of pH milk were 6.77,6.73,6.73,6.71 and lactose (milk sugar) were

4.68,4.55,4.45,4.42% and solids non fats were 8.30,8.49,8.48,8.69% of four treatments respectively. We notes from this results presented in tables (3) were improved significantly in average percentage of milk protein by increasing level of dried brewers grains in dairy Frisian cows rations may be due to formed microbial protein in the rumen of dairy cows that were consumed diets contained dried brewers grains as a protein source were substitute by SBM and connecting to small intestine beside protein food transit from the rumen to small intestine, which reflected positively in milk protein and utilize it for milk protein as compared with the Frisian cow which consumed control diet (Schmit 1970,ARC 1984).

Through these results presented in tables (3) indicated an improved significantly in proportion of milk fat with by increasing proportion of dried brewers grains in dairy Frisian cows diets and is due to reduce the speed of starch decomposition in rumen, which leads to raise value of acidity in rumen to the top of the critical point ((pH=6), which in turn gives a positive opportunity for bacteria analyst cellulose and make environment suitable best in rumen is hydrolize and digest fiber,which is reflected by increase the percentage of Acetic acid than propionic and thus leads to increase the percentage of milk fat (Mould et al 1999, Kassem 2002).The results of this study was agree with Polan et al (1985) who found significant differences in percentages of crude protein and crude fat in milk Frisian cows which was fed on dried brewers

grains than control diet that contain SBM in the rations.Also agreed with the findings of Belibasakis and Tsirgogianni (1996) who they noted significant increase in percentage of milk fat (4.08%) in favor of dairy cows were intake dried brewers grains in diet than control group of cows which consumed SBM and grain maize (3.82% milk fat).As well as the results was agreed with results of Kaset (2000) who noted a significant increase in percentages of crude protein and crude fat milk in dairy Holstein cows which were fed on 10,20,30% dried brewers grains in experimental diets as compared with control group.As far as this results was agree with results of Kazemi et al (2009) who found highly significant differences in average percentage of crude protein in milk of Holstein cows when they used different levels of barley distilled in diets of dairy Holstein cows. While results of this study was inconsistent with results of Firkins et al (2002) who found no significant effect of dried brewers grains in percentages of crude protein, crude fat in milk of Holstein cows among four nutritional treatments (0,8.65,17.29, 25.94% dried brewers grains).Moreover,this results was not agree with the results of Dhiman et.al. (2003) who found no significant differences on percentages of milk fat,milk protein,lactose,SNF among treatments when they were using dried and wet brewers grain as protein source in diet of Holstein- Frisian dairy cows.Also,Kazemi et al (2009) who did not find any significant effect of the level of barley grain distilled in average

percentages of crude fat, solids non fats in milk of Holstein cows when they used different levels of barley distilled in dairy Holstein cows rations. Although this results was not agree with results of said Mahnken (2010) who did not found any significant differences in average percentages of crude protein, crude fat

between milking Frisian cows groups which was fed on different levels of wet brewers grains at levels of 0,12,18,24% in rations as compared which has been replace partially and totally with maize silage in control ration of dairy Frisian cows.

Table (3): Effect of dried brewers grains level on milk yield and its composition of dairy Frisian cows.

traits	First treatment (0% dried brewers grains)	Second treatment (10% dried brewers grains)	third treatment (20% dried brewers grains)	Fourth treatment (30% dried brewers grains)
1- milk yield (kg). **	9.348 ± 0.69 D	11.797 ± 0.53 C	14.927 ± 0.21 B	16.060 ± 0.12 A
2- pH milk	6.77 ± 0.05 A	6.73 ± 0.03 A	6.73 ± 0.01 A	6.71 ± 0.03 A
3- moisture (%).*	88.56 ± 0.14 A	87.83 ± 0.28 AB	87.74 ± 0.19 AB	87.27 ± 0.21 B
4-ash (%). *	0.64 ± 0.07 B	0.77 ± 0.07 AB	0.81 ± 0.06 A	0.87 ± 0.07 A
5-crude protein (%). **	2.98 ± 0.23 C	3.17 ± 0.17 B	3.22 ± 0.18 B	3.40 ± 0.15 A
6- milk fat (%). *	3.14 ± 0.09 B	3.69 ± 0.20 A	3.78 ± 0.07 A	4.04 ± 0.10 A
7- lactose sugar (%) :	4.68 ± 0.13 A	4.55 ± 0.10 A	4.45 ± 0.17 A	4.42 ± 0.28 A
8- solid non fats (%).	8.30 ± 0.23 A	8.49 ± 0.10 A	8.48 ± 0.15 A	8.69 ± 0.18 A
9- total solids (%). *	11.44 ± 0.14 B	12.17 ± 0.28 AB	12.26 ± 0.19 AB	12.73 ± 0.03 A

The trait which carrying averages with different letters horizontally indicates a significant differences at probability 0.05 or 0.01 .

* significant differences at the level of probability 0.05 .

** highly significant differences at the level of probability 0.01 .

Conclude from these results of this experiment that increase the proportion of dried brewers grains in dairy Frisian cows diets had led to significantly improve in daily milk production , percentages of crude protein, crude fat, total solids in experimental groups as

compared to control group. In addition the results indicated to increase amount of microbial protein formed in rumen of dairy cows which consuming experimental diets beside food protein transit and this led naturally to increase flow speed of microbial protein gut and

its impact reflected on increasing amount of amino acids absorbed from the intestines and thus shown significantly improved increase in amount of daily milk production and percentages of crude protein, crude fat as compared to control diet. Moreover, this results of this experiment was appeared that diet containing 30% dried brewers grains has given best of the criteria used in this experiment has given the highest output of daily milk which amounted to 16.060 kg and also this diet is considered is high-capacity for feed conversion, which amounted to 1.294 kg feed consumption / kg milk product .

References :

- AL-Khawaja, A.K., A.A.and S.Abdul-Ahad .1978)The chemical composition and nutritional value of feedstuffs in Iraq. Bulletin issued by the Department of Nutrition at the Animal Resources Management, Ministry of Agriculture and Agrarian Reform ,Baghdad, Iraq.
- AL-Khazrage,K.Kh.K., .1983.Use of different levels of brewers dried grains in the fattening of Iraqi lambs (Awassi and Hamdani).Msci.thesis in Animal production, college of agriculture and forestry,Mosul University, Mosul,Iraq.
- AL-Rawi, Kh.M., A.M.Khalaf-Allah .2000.Design and Analysis of Agricultural Experiments.Dar AL-Kutob press for printing and publishing,college of agriculture and forestry,Mosul University,Mosul,Iraq.
- Agricultural Research Council (ARC) .1984.The nutrients requirements of ruminant livestock.Common wealth Agricultural Bureaux,Slough,UK .
- Anonymous, .2002.Statistical analysis system (SAS).SAS institute Inc. Release 6.12 Tsozo, North Carolina state University of Cary, NC, U.S.A.
- Belibasakis, N.G.and D.Tsirgogianni .1996.Effect of wet brewers grains on milk yield, milk composition and blood components of dairy cows in hot weather. Animal Feed Science and Technology; 57(Issue 3) : 175-181 .
- Davis,C.L.,D.A.Grenawalt and G.C.McCoy .1983.Feeding value of pressed brewers grains for lactating dairy cows.Journal of dairy science; 66 (Issue 1):73-79 .
- Dhiman,T.R.,H.R.Bingham and H.D.Radloff,(2003).Production response of lactating cows fed dried versus wet brewers grain in diets with similar dry matter content.J.Dairy Sci.86 : 2914-2921 .
- Duncan, C. B. (1955). Multiple range and multiple "F" tests. *Biometrics*. 11: 1-12.
- Firkins,J.L.,D.I.Harvantine,J.T.Sylvester and M.L.Eastridge .2002.Lactation performance by dairy cows fed wet brewers grains or whole cottonseed to replace forage. Journal of dairy science; 85 (Issue 10) : 2662-2668 .
- Hoffman,P.C.,and L.E.Armentano. 1988.Comparison of brewers wet

- and dried grains and soybean meal as supplements for dairy cattle. *Nutr.Rep.Intl.*;38:655-663.
- Kaset, Warasan . 2000.Effect of dried brewers grains levels in diets on milk yields and milk composition in Holstein Friesian dairy cows. *Journal of Agriculture* ; 16(1) ; 83-91 .
- Kassem, M.; Thomas, P.C.; and Chamberlain, D.G., .2002.Food intake and milk production in cow given barley supplements of reduced ruminal degradability. *Recent Technologies in Agriculture Proceedings of the 2nd Congress. Special Ed. Faculty of Agric. Cairo University, 27-30 October, 564-570.*
- Kazemi,M.,A.M.Tahmasbi,R.Valizadeh, M.D.anesh Mesgaran and A.A.Naserian .2009.Effect of ensiled barley distillers grains for Holstein dairy cows. *Journal of Animal and Veterinary Advances* ; 8(4) : 807-813 .
- MAFF,Ministry of Agriculture , Fisheries and Food .1975. Department of Agriculture and Fisheries for Scotland Energy allowance and feeding system for ruminants. *Technical Bulletin* ,No.33,484-497.
- Mahnken,Christa Lynn .2010.Utilization of wet brewers grains as a replacement for corn silage in lactation dairy cows diets. Master of science thesis, Department of Animal Science and Industry, College of Agriculture, Manhattan, Kansas,USA.
- Mould, F.L., E.R.Orskove and S.O.Mann, .1999. Associative effects of mixed feeds. I. Effects of type and level of supplementation and the influence of the rumen fluid pH on cellulolysis *in vivo* and dry mater digestion of various roughages. *Animal Feed Science and Technology*, 10, 15-30.
- National Research Council (NRC),.1975.Nutrient requirements of dairy cattle.5th revised edition, National.Academy of Science Press . Washington ,D.C,USA .
- National Research Council (NRC),.2001.Nutrient requirements of dairy cattle.7th rev.ed.,Washington ,D.C.: National.Academy Science Press .
- Ojowi,M.,J.J.McKinnon,A.Mustafa and D.A.Christensen .1997.Evaluation of wheat-based wet distillers grains for feedlot cattle. *Can.J.Anim.Sci.*;77:447-454 .
- Polan,C.E.,T.A.Herrington,W.A.Wark and L.E.Armentano .1985.Milk production response to diet supplemented with dried brewers grains or soybean meal. *Journal of dairy science*; 68(Issue 8) : 2016-2026 .
- Pond,U.K. and M.Mishra .1981.Feeding value and economics of mixed forages in milk production. *Indian J.Dairy Sci.*; 34 :49-53 .
- Saleh,M.N.A.,.2008.Using Concentrate Feed Reduced Degradability on Feeding Sheep effect on reproductive and performance. pH.thesis,Animal Resources Dept.,

- college of agriculture and forestry,
Mosul University, Mosul, Iraq.
- Schmidt,G.H., .1970.Biology of
lactation, (A Series of Books in
Animal Science).Publicated in
Freeman & company limited,
W.Hx., Hardcover, page: 317.USA
- Shamoon,S.A.,N.H,Salih,1990.Effect of
using some different protein
sources in dairy cows rations.
Journal of Mesopotamia
Agriculture; 22(3) :167-178 .
- Taha,A.A.S. and M.A.A. Farhan
.1980.Feed and Feeding. first press,
Ministry of Higher Education and
Scientific Research, Dar AL-Kutob
press for printing and publishing,
College of Agriculture and
Forestry, Mosul University,
Mosul,Iraq.
- Taha,A.A.S.,At.Saeed,M.R.Taka,,1984.
Animal Nutrition,6th ed.by
(Maynard and Loosli).Translated
into Arabic Language. Dar AL-
Kutob press for printing and
publishing,college of agriculture
and forestry,Mosul
University,Mosul,Iraq.
- West, J.W., L.O. ELY,. and S.A.
Martine ,. 2002. Wet brewers
grains for lactating dairy cows
during hot, humid weather. *J. Dairy
Sci.*, 86:196-204.
- Valentine S.C.,and R.B.Wickes
(2003).The production and
composition milk from dairy cows
fed hay and supplemented with
either brewers grains or rolled
barley grain.Australian J.of
experimental Agriculture and
Animal Husbandry.; 43 : 155-158 .
- Younker,R.S.,S.D.Winland, J.L.Firkins
and B.L.Hull .1998.Effect of
replacing forage fiber or nonfiber
carbohydrates with dried brewers
grains. *Journal of dairy science*;
81(Issue 10) : 2645-2656 .