Evaluation of production and cost of the recommended nutrient requirement for Lactating cows in Khartoum state, Sudan

By

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A thesis submitted in partial fulfillment of the requirements for the degree of M.Sc. In dairy production and technology

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April 2009

DEDICATION

I dedicate these pieces of work…..

To my father…

My Mother…

My brothers…

My sisters…

With my love…

Naba

April 2009

بسم الله الرحمن الرحيم

الاية:-

قال تعالى ((وان لكم فى الانعام لعبرة نسقيكم مما فى بطونه من بين فرث ودم لبنا خالصا سائغا للشاربين))

النحل الاية (66)

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Acknowledgment

Iam grateful to Alla for giving me endurance and strength to carry out this work with success.

Special thank to my supervisor Dr: Kamal Elabid for his continuous encouragement and a great share through this work.

My appreciation is extended to the staff of The JUDICIARY DAIRY FARM for their great help.

Special thank are also due to Dr: Abded Nasir M.A.Fadel Elseed and Dr: Adam Elhaj.

My thanks are also extended to my Family for their help and kind ness during my study.

Finally I would like to extend my thanks to every one who directly or indirectly helped me during this study.

Abstract

An experiment was carried out to evaluate production and economic feasibility of using the recommended nutrient requirements for lactating cows in small scale dairy farms in Khartoum state. The study consisted of two parts; a survey of 90 dairy farms in Khartoum State and an experiment carried out on 16 lactating dairy cows in the Judiciary farm. These cows were divided into two groups: A and B (8cows in each group). Group A was distributed in eight pens and given balanced ration, whereas group B was fed as practiced in the farm. The experiment lasted for seven months extending from January to July 2007.

The survey results revealed that the balanced ration costs were only 23%, 38% and 55% of unbalanced ration at 10,15 and 20 lbs level of milk production respectively.

The results of the experiment revealed that the use of balanced ration increased the cow milk production by 27% compared with the unbalanced ration. The four months milk yield of cows fed balanced and unbalanced ration were significantly different ($P<0.05$). The mean cost of four months milk production for cows fed balanced ration was significantly ($P<0.05$) lower than these fed unbalanced ration, being 435 and 578 SDG, respectively. The mean cost of production per pound of milk for cows fed balanced ration was significantly ($P<0.05$) lower than the cows fed unbalanced ration; it was 0.107 and 0.206 SDG, respectively. The balanced ration has a greater trend coefficient of 32.36 compared with 18.56 for the unbalanced ration.

المستخلص

اجريت تجربة لتقويم الانتاج والجدوى الاقتصادية. لاستخدام الاحتياجات الغذائيه الموصى بها لابقار اللبن فى مزارع الالبان الصغيرة فى ولاية الخرطوم.وكانت التجربة من جزائن هما استبيان ل 90 مزرعة البان صغيرة فى ولاية الخرطوم وتجربة على 16 بقرة حلوب فى مزرعة القضائية ، قسمت الابقار لمجموعتين أوب (8 ابقار فى كل مجموعة).

وزعت المجموعة أ على ثمانية حظائر بصورة منفردة واعطيت العليقة المتوازنة غذائيا فى حين ان المجموعة ب غذيت حسب التغذية الممارسة فى المزرعة. استمرت التجربة لمدة سبعة شهورامتدت من يناير الى يوليو 2007.

اوضحت نتائج الاستبيان ان تكلفة العليقة المتوازنة كانت تساوى 23%و 38%و 55% من تكلفة العليقة غيرالموزونة عند مستويات 10و15و20 رطل من انتاج اللبن على التوالى .

واوضحت نتائج التجربة ان استخدام العليقة الموزونة يؤدى الى زيادة انتاج ابقار اللبن بنسبة 27% مقارنة بأ نتاج الابقار التى غذ يت على عليقة غير موزونة غذائيا وان انتاج اللبن لاربعة شهور للابقار التى غذيت على عليقة موزونة وعليقة غير موزونة يختلف اختلافا معنويا ($P<0.05$).

كذلك اوضحت نتائج التجربة ان تكلفة انتاج اللبن لاربعة شهور للابقار التى غذيت على العليقة الموزونة اقل معنويا ($P<0.05$) من تكلفة انتاج الابقار التى غذيت على عليقة غير موزونة وكانت النتائج المسجلة على النحو التالى435 و 578 جنيها سودانيا على التوالى. فى حين ان تكلفة انتاج رطل اللبن من الابقار التى غذيت على عليقة موزونة اقل معنويا ($P<0.05$) من تكلفة انتاج رطل اللبن من الابقار التى غذيت على عليقة غير موزونة. وسجلت النتائج التالية 0.107 و 0.206 جنيها سودانيا على التوالى.

كذلك اوضحت نتائج التجربة ان معدل زيادة انتاج اللبن فى الابقار التى غذيت على عليقة موزونة (32,36) كان اكبر من معدل زيادة انتاج اللبن فى الابقارالتى غذيت على عليقة غير موزونة (18.56).

CHAPTER ONE

INTRODUCTION

Although Sudan is highly endowed with huge amount of livestock, together with vast pastoral levels, feed stuffs and water resources, which all qualifies the country to be one of the major meat and milk producers and exporters, but unfortunately it is very common to find large amounts of imported powdered milk widely sold in the local markets.

The dairy cow has special requirements which her diet has to provide. Dairy cows require feed nutrients for maintenance, growth, lactation and reproduction (Orskov, 1998). The dairy cow feeding program affects productivity and profitability more than any other single factor. The effects of good breeding and management program can not be fully realized without good feeding program. Good management of cows with good genetic potential will result in the most efficient response to good nutrition (Krober et al, 1999 and Niels et al., 2003).

Feeding excess protein in relation to requirement impairs reproductive performance (Shing field et al., (1999), reduced energy availability and cause economical losses (Ferquson and chalopa, 1989).

Some of the livestock breeders are proved to be accustomed to feed their herds with unbalanced rations which are known to increase the cost of production and also to negatively affect the well being of animals, the price of animal products, and above all adversely affect the revenues and profit gained by the animal owners (Fadel Elseed *et al*., 2008) so the present study was conducted to:-

1-Compare milk production of cows fed balanced and unbalanced ration.

2-Study the economic feasibility of using balanced ration.

CHAPTER TWO

LITERATURE REVIEW

2-1 Maintenance requirement of dairy cow:-

Measured fasting heat production (Flatt *et al.*, 1965) in dry non pregnant dairy cows averaged 0.073 mcal/kg BW 0.75; however, an estimated fasting heat production using regression analysis suggested an identical value. Because these measurements were made with housed cows in tie stalls in metabolic chambers, a 10% activity allowance was added to account for normal voluntary activity of cows that would be housed in free stall systems. Due to that the maintenance requirement is set at 0.080 mcal/kg BW 0.75 for mature dairy cow. Cows of similar size and breed may vary in their maintenance requirements, even under controlled activity condition, by as much as 8 to 10 % (Van ES, 1961). Very few direct comparisons have been made on effect of dairy cattle breed on energy metabolism. Tyrrel *et al* (1991) compared none lactating and lactating Holstein and Jersey cows. Although actual milk yields were greater for Holstein cows than Jersey cows, the energy output in milk as function of metabolic weight was similar, and there was no evidence to suggest that energy requirements for maintenance or production were different between breed

2.2 Energy requirement of Lactating cow:-

The net energy required for lactation (NEL) is defined as the energy contained in the milk produced. The NEL concentration in milk equivalent of the heats of combustion of individual milk components (fat, protein and lactose). Reported heats of combustion of milk fat, protein and lactose are 9.29, 5.71 and 3.95 Mcal/kg, respectively. Frequently, milk fat and protein but not milk lactose is measured. Milk lactose content is the least variable

milk component and is essentially a constant 4.85% of milk and varies only slightly with breed and milk protein concentration.

According to NRC (2001) NEL concentration in milk is calculated as:

NEL (mcal/kg) = 0.0929 × fat % + 0.0547 × crude protein % × lactose %.

When only fat and protein in milk are measured and the lactose content of milk is assumed to be 4.85% the NEL concentration of milk is calculated as:

NEL (mcal/kg) = 0.0929× fat % + 0.0547 × crude protein % + 0.192.

2.3 Lactation responses to CP:-

When CP content of diets change the relative contribution of protein from different source, milk yield increased gradually as diet CP concentrations increased. The regression equation obtained was:

Milk yield= 0.8 × DMI + 2.3 × cp – 0.05 × cp^2 -9.8 (r^2=0.29) Where milk yield and dry matter intake are kilograms/d and CP is percent of diet DM.

The maximum milk production was obtained at 23 percent CP. However the amount of CP to include in the diet will depend on milk yield, milk protein percentage, growth rate, body size, energy contents and type. As well as amino acids composition and degradability of dietary protein. Generally, the amount of CP in the diet will need to be increased if the requirement for rumen degradable protein (RDP) is not met (NRC, 2001).

2.4 Effect of deficient or high concentration protein in the diet:-

If the diet is deficient in protein or if the protein resists degradation, concentration of rumen ammonia will be below and the growth of rumen microorganisms will be slow, inconsequence, breakdown of carbohydrates will be retarded. Increasing the protein concentration of the diet of lactating

dairy cow can often increase milk production. Daily milk production increased linearly from 13.8 to 23% (Grings *et al*., 1991). However efficiency of use of dietary protein for milk production decreased as more protein was wasted.

2.5 Effect of protein on reproduction:-

Barton *et al*., 1996 reported that excess dietary CP may inhibit fertility by suppression of the immune system through some nitrogenous compound that reduces the cow's response to an antigenic stressor included reduced conception, more days open, or delayed ovulation accompanied, in some cases, by lower plasma progesterone concentration from other side high dietary protein intake also influenced the plasma concentration of luteinizing hormone and progesterone,(Jordon and Swanson 1979a)

2.6 Different percentages and source of CP:-

Across CP sources, feeding the low CP diet decreased DMI by 1.1 and 1.3kg/d from day 15 to day 112 compared with the middle CP and high CP diets, respectively. Similar decreases in DMI were reported by Weigel *et al*., 1997 and Broderick, 2003 when CP content of diet fed to moderate or high-producing cows was decreased from about 18 to about 15%. However, this negative response to similar decrease in the input of dietary CP has not always been observed (Kalschevr *et al*., 1999; WV and Satter, 2000). A lack of major changes in DMI of high-producing cows fed diets in which the concentration of CP was decreased from 19 or 18 to about 16% appears to be a more consistent outcome (Christensen *et al*., 1993; Cunningham *et al*., 1996; Komaragii and Evdman, 1997; Leaonardi *et al*., 2003). In a companion study (Ipharragverre *et al*., 2005), indicated that percentage of dietary CP did not alter significantly the ruminal fermentation of organic

matter or the amount of microbial N that passed to the small intestine, suggesting that reduced DMI for the low CP diet was probably independent of shortage of available N in the rumen that impaired nutrient digestibility. Even- though the molar proportion of propionate was unaffected by percentage of dietary CP, the amount of starch consumed and fermented in the rumen decreased by 16 and 54%, respectively, as the concentration of CP increased from low CP to high (Ipharragverre *et al*., 2005). Therefore it seems reasonable to speculate that more propionate was produced and absorbed from the rumen of cows fed the low CP diet compared with cows fed higher dietary CP. Increased supply of propionate to the liver might have provided a signal for hypophagia, leading in turn to reduced DMI (Allen,2000; Oba and Allen, 2003). An other potential explanation is that as CP increased in the diet the concentration of ammonia N in blood might have increased because of an increase in ruminal production of ammonia (N) (Ipharragverre *et al*., 2005),resulting in a decline of the glucose-mediated release of insulin by the pancreas (Fernandez et al., 1990) and consequently in reduced hunger (Allen, 2000).

2.7 Effect of Level of Concentrate on Milk Production:-

The literature concerned with feed input – milk output relationship has been reviewed by Blaxter (1950), Reid (1956) and Burt (1957).

Reid (1956) and Huffman (1961) indicated that high level of concentrate feeding of dairy cattle stimulated increased milk production. Charran (1960) has reported increased milk production, when cows were fed concentrates to the point of adlib feeding in early lactation. Olson et al, (1965) reported that an entire herd could be fed concentrate *adlib*, but at the expense of the efficiency of nutrient utilization, since it will drop to relatively low level. From another side researchers Bishop et al, 1963 and Brown et al, 1962 demonstrated that *adlib* feeding of concentrates or restricted forage feeding reduced milk production efficiency. Gulzar and Gill (1979) found that feeding Berseem or Lucerne could sustain milk production up to 16 kg/d which agrees with Mothor et al, (1963) and Mudgal (1971) who reported that good quality fodder could sustain milk production up to 16 kg milk per day.

Gordon (1976) observed that the significant increases in milk production associated with increased concentrate feeding level were due to increased protein consumption as was established by Broster (1972). A similar curvilinear response of milk production to increased roughage feeding was obtained by Gordon and Kormas (1973) using levels of dried grass feeding ranging from 0.28 to 0.61 kg/kg milk.

Steen and Gordon (1980) found that the increase in total DM intake result in increased milk yield during an indoor treatment this agreed with results of Gordon (1976)) and Butler (1976) who obtained 0.44and 0.39 kg milk per kg concentrate respectively. Such results contraindicated with the finding of Gordon and Horne (1975) who obtained no response in milk yield

when the level of concentrate was increased above 7.3 kg per day and Ostergaard (1979) who was unable to show any increase in the response to additional concentrates feeding, and Thomas (1980) who found no evidence of a response being a function of milk yield. From the other side the effect of increasing level of concentrate was supported by the finding of Gordon (1980) who reported mean lactation response of 1.4, 0.7 and 0.5 kg milk/kg concentrate with concentrate levels of 4, 6, 8 kg /day, and Danker and Macclure (1982) who found that milk yield increased as concentrate feeding increased as was observed by (Apgar et al. 1966, Broster 1972, Ekern 1971 and Smith 1976). Brown and Chardler (1978) and Lamb et al, (1974) observed that with increased concentrate feeding yield of fat corrected milk (FCM) did not increase as much as milk yield suggesting that fat contents of milk were reduced dueto high concentrate feeding. The result of Donker and Mac clure (1982). Both reported a much less lactation response from high rates of concentrate feeding than from low level of concentrate, and the latter level of the response could be described as Linear. Gordon (1984) observed that lactation response to concentrate supplementation were greater than those reported by Strick Land (1975) and Johnson (1977). The last two authors reported a mean response of 1.5 and 1.3 kg milk /kg concentrate respectively. However Steen (1978) reviewed the results of 28 similar studies, and estimated a mean lactation response of 0.59kg milk/kg additional concentrate. Thomas (1980) reported a mean lactation response of 0.79 kg milk/kg concentrate fed.

Still many researchers illustrated the effect of level of concentrate feeding on level of milk production; Ostergaard (1979) used three levels of concentrate supplementation and reported a mean lactation response of 0.71 kg milk/kg concentrate fed. Leaver and Moisey (1980) reported a mean

lactation response of 0.34 kg milk/kg concentrate above and over concentrate levels of 5.0 and 9.0 kg/day. Gordon (1982) reported a mean lactation of 0.11 kg milk/mime. These differences in lactation response may be due to the quality of forage consumed and stage of lactation. Steen and Gordon (1982a) reported no difference in 4% FCM yield and DM intake with varying stages of maturity or from alfalfa hay fed milk two level of concentrate. However Kawas et al, (1983) observed a greater reduction in yield of 4% FCM as maturity of alfalfa advanced and proportion of concentrate decreased in the diet. De Peter and Smith (1986) observed anon -significant improvements in feed intake, milk yield, milk composition and body weight status of cows fed diet containing higher quality alfalfa hay.

2-8 Dry cows feeding:-

The periparturient period (21 day prepartum to 28 day postpartum) may be the most critical time in a dairy cow's production cycle. This period is characterized by rapid fetal growth (Eley *et al*., 1978; Bell *et al*., 1995; McNeill *et al*., 1997), metabolic transitions to support the ensuing lactation (Bauman and Currie, 1980), lactogenesis (Capuco *et al*., 1997), and rumenal adaptations to a change in diet. Improving the nutrition of the cow during this period may reduce prepartum tissue mobilization and enhance health, Dry Matter Intake (DMI), and milk production.

An increase in tissue reserves of the cow during the periparturient period is difficult to achieve because DMI is typically depressed during the last week before calving (Bertics *et al*., 1992). However, the critical issue relative to enhancing the tissue reserves at parturition is actual nutrient delivery, which is a function of DMI nutrient density of the diet and

efficiency of nutrient utilization. Nutrient delivery becomes complicated in the transition cow because of the intake depression, which may be accompanied by a decrease in rumen volume (Forbes, 1968) and an increase in rate of passage, as observed in the beef cow (Stanley et al., 1993). The depression in DMI may not be a critical issue if nutrient delivery to the cow can be achieved by increasing the nutrient density of the diet and total digestive tract efficiency.

National Research Council NRC (1989) recommendations for the dry cow do not suggest increasing the concentration of dietary nutrients as the cow approaches parturition, but it is common practice to introduce feedstuffs common to the lactation diet into the dry cow diet 14 to 21 day before parturition. This practice increases the energy and protein densities of the diet in an effort to improve the tissue reserves of the cow and acclimate the rumen microbial population as currently recommended by the NRC (2001). Grummer (1995) suggested that the energy content, particularly rumen soluble carbohydrates, of prepartum diets is more important than the protein content. Recent research (Wu *et al*., 1997; Putnam and Varga, 1998; Greenfield et al., 2000) have not demonstrated benefits postpartum from increasing protein in prepartum diets above NRC (1989) recommendations. All of these studies utilized energy levels above NRC (1989) recommendations; however, Putnam and Varga (1998) used energy levels considerably higher than the other two 1.72 vs. 1.5 Mcal/kg of NE_L and reported an increase in nitrogen retention in late-gestation dairy cows in response to higher levels of dietary protein, but milk production was unaffected; however, prepartum intake was held constant. It is possible that postpartum benefits occur when protein is increased in prepartum diets that

contain surplus energy (above 1.7 Mcal/kg of NE_L) and are provided ad libitum.

3.9 Economic Information:-

Muller and Fales (1998) reported that total mix ration system is more profitable over most changes in feed cost or milk revenues and also explain that some of the live- stocks breeders proved to be accustomed to feed their herds with unbalanced rations which are known to increase the cost of production and to affect the well being of these animals the price of animals, products, and above all to adversely affect the revenues and project gained by the breeders.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Data collection:-

Data collection was made through the following methods:

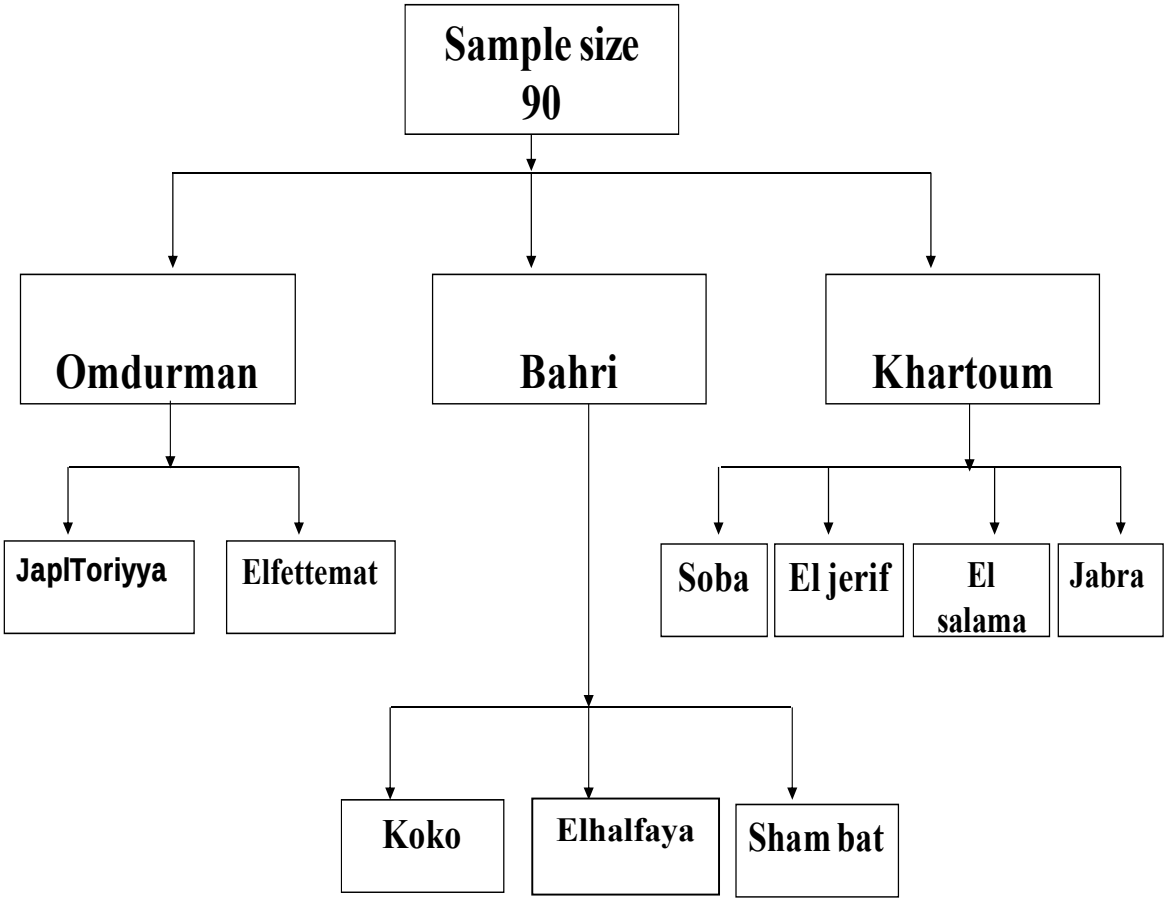
1- Field investigations (site visit) via structured questionnaire.

2- Experiment

3.1.1. Field Investigation:-

The study covered 90 milk farms which all located within Khartoum state. The process of data collection continued for three months. Data were collected from Khartoum (namely Jabra , Salama, Jereif west and soba hilla) and from Khartoum North locality (namely shambat, Hillat koko and halfaya) and from Omdurman locality (Fettemat village and Jebel Toriyya) as illustrated in the following Diagram 1.

Figure (1) Field investigation



3.1.2. Experiment:

The experiment consisted of one feeding trials in cross bred cows in Judiciary farm which comprises of two major sections, Horticulture and animal production (cows - camels and poultry). This farm was established in 1994 by a foundation, herd composed of 14 graded cows. The total numbers of animals now is about 200 cross bred between local Kenana / Butana and Holstein – Friesian.

The trials were comparison between balanced ration (ration, A) and the ration given at the farm (ration, B). Ration A composed of 50.9% sorghum grains, 12.6% groundnut cake, 31.8% wheat bran, 1.8% sodium chloride and 2.9% oyster shell, while ration B composed of 24.9% sorghum grain, 28.6% groundnut cake, 23.8% wheat bran, 1.8% sodium chloride and 2.9% oyster shell. Chemical composition of both rations (table, 1) were analyzed according to AOAC (1990). Experimental ration was formulated, based on the locally available concentrate feeding stuffs to contain varying levels of energy and crude protein, and were fed to the experimental animals in addition to roughage (Abu 70, berseem and Bagasse). The effect of the feeding the different ration on Milk yield of cows and economics of feeding was observed.

3.1.2.1. Duration and Study area:-

The experiment lasted for four months from April to July, 2007, during summer in which the temperature ranged between 24.6 to 41.1c. (Sudanese meteorological Department).

3.1.2.2. Herd Housing:-

The herd is housed in traditional housing constructed from Iron barns and Zinc roofs, bedded with soil and manure, the water basins made of Cement and Iron containers, and water is available adlibitum at any time. The animals were divided in different accommodations. There were barns for calves, elders, dry cows, lactating cows, isolating barns for isolation of sick animals and newly purchased animals.

3.1.2.3. Herd Feeding:-

The herd is fed green roughages composed of sorghum (Abu 70) or Berseem according to availability, dry roughages (Bagasse), these roughages are given in the morning. Cows some times depend solely on dry roughages when green roughages are not available, and concentrate ration distributed twice a day after milking.

3.1.2.4. Herd management:-

Both natural and artificial in seminarian were practiced, but currently only natural matting is adopted. The cows almost mated two months after calving, while heifers were mated when they reach puberty, the cows are dried off when production drops, and before two months of calving (Parturition). The cows were culled for low Milk yield, low reproductive capacity and illness and male calves in one year were sold.

3.1.2.5. Herd Health:-

Due heath care was giving by veterinarian supervise therefore by detecting any illness cases in cows or calves, and treatment of any sick animal,. Also there was vaccination for the herd against brucellosis and other

infections diseases. There were also medication against external and internal parasites, with routine cleaning and spraying using antiseptics for all premises of the farm were practiced.

Table (1): Chemical composition (%) of balance (A) and unbalanced ration (B):-

Chemical component	Ration(A)	Ration (B)
DM	94.91	94.91
Fat	5.09	5.09
CP	18	24.89
CF	20.65	20.65
Ash	12.95	12.95
NFE	36.43	36.43
ME	11.35	10.7

3.1.2.8 Experimental Animals:-

A total of 16 mature cross bred cows with similar average weight, age and production level were used, eight cows for each ration. Group (A) was given the balanced ration of concentrate according to their nutrient requirements (NRC, 2001), twice daily after milking in morning and evening while group (B) was given a fixed amount of concentrate irrespective to their nutrient requirement (8 kg per day) twice daily. All animals were allowed free access to the experimental diets for two months prior to the commencement of the treatment.

3.3. Statistical Analysis:

The collected data was subjected to statistical T test and standard statistical economic analysis. All analysis was done by the computer program (SPSS, 2000)

CHAPTER FOUR

RESULTS AND DISCUSSION

1/Field survey

Table (2) and figure (2) shows the percentage of the cost of balanced rations to the cost of unbalanced ones at different levels of milk production. The balanced ration costs are only 23% 38% and 55% of unbalanced ration at 10, 15 and 20 lbs of milk level of productivity respectively. On average, the costs of balanced rations are only 38 percent at the different levels of milk production. These results agreed favorably with Muller and Fales (1998) who reported that some of the livestock breeders accustomed to feed their herds with unbalanced ration which are known to increase the cost of production due to inefficient use of diet content.

Table (2) Costs of the Balanced and Unbalance Rations (Cow/day in SDG) in Khartoum State

Productivity Level Lbs of milk	Costs of Balanced Ration (1)	Costs of unbalanced Ration (2)	(1) as % of (2)
10	1.716	7.46	23
15	2.288	6.06	38
20	3.484	6.39	55

Source: Field Survey 2007

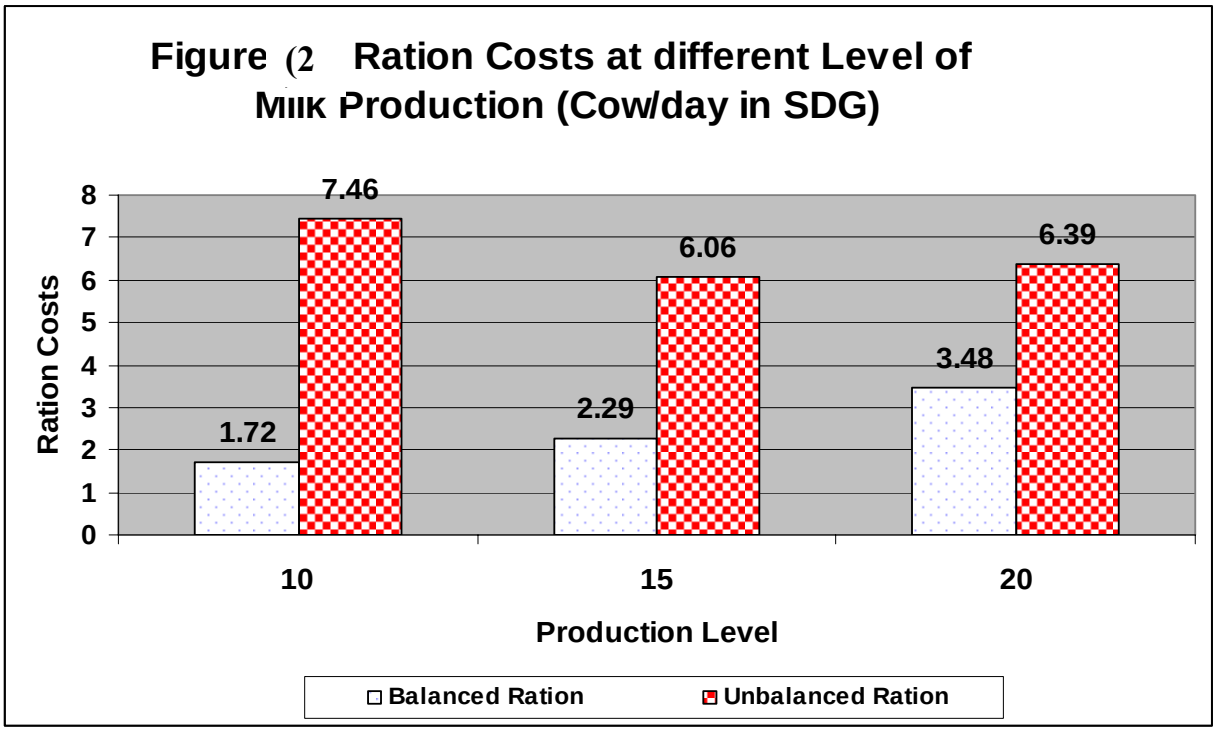


Figure (2 Ration Costs at different Level of Milk Production (Cow/day in SDG)
Ration Costs
8
7
6
5
4
3
2
1
0
7.46
6.06
6.39
3.48
2.29
1.72
10
15
20
Production Level
Balanced Ration
Unbalanced Ration

2/On farm trial:-

The data in table (3) illustrated that balanced ration significantly ($P<0.05$) increased the level of cow milk production by 27% compared to that of unbalanced ration. The recorded values for cows fed balanced and unbalanced ration for four month milk yield were 3987.41±348.15lb and 3145.12±536.82lb, respectively.Similar results were recorded by Ferquson and chalopa (1989), Krober et al., (1999) and Niels et al.,(2003), who reported that feeding excess protein to requirement reduce energy availability and affect cow productivity and this may be attributed to that excess N will be emeses in the environment.

Table (3): Comparison between four month milk yield of the two experimental groups:-

Groups	Mean milk yield /Lb	SD
A	3987.41a	± 348.15
B	3145.12b	± 536.82

The data in table (4) dedicated that the mean cost of four months milk production for cows fed balanced ration was significantly ($P<0.05$) lower than that of cows fed unbalanced ration. The recorded values for the cost of milk production for cows fed balanced ration were 435.00±83.41 and 578.43±37.49 SDG, these results agreed favorably with Muller and Fales (1998) who reported that total mix ration system is more profitable over most changes in feed cost or milk revenues,

Table (4): Comparison between the cost\of four months milk production of the two experimental groups.

Groups	Mean cost\SP	SD
A	435.00a	± 83.41
B	578.435b	±37.49

The data in table (5) illustrated that the mean cost of production per pound of milk for cows fed balanced ration was significantly ($p<0.05$) lower than that of cows fed unbalanced ration it almost half of it, the recorded values for the cost per pound of milk for cows fed balanced and unbalanced rations were 0.107±0.00 and 0.206±0.08 SD.

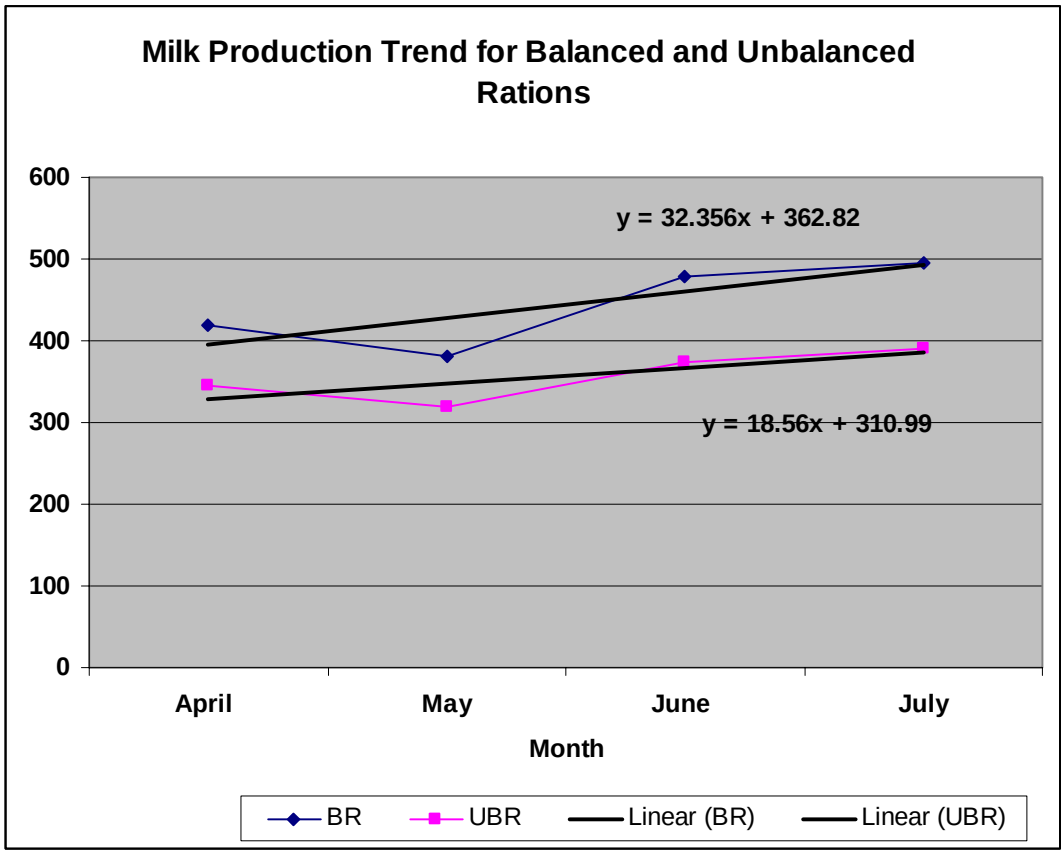
Table (5): Comparison between the cost/Lb for the two experimental groups:-

Groups	Mean cost\SP	SD
A	0.107a	± 0.0
B	0.206b	± 0.08

∗Mean in the same column carrying similar superscripts are not significantly different at (p < o.o5) level.

Figure (3) show that both rations showed appositive trend of milk production .How ever the balanced ration has a greater trend coefficient of (32.36) compared to (18.56) for the unbalanced ration this result illustrated that balanced ration significantly increase the milk production with advancement of the time and this will ultimately lead to lower price for consumer and higher benefit for producer.

Figure(3)


Milk Production Trend for Balanced and Unbalanced Rations
600
500
400
300
200
100
0
y = 32.356x + 362.82
y = 18.56x + 310.99
April
May
June
July
Month
BR
UBR
Linear (BR)
Linear (UBR)

CHAPTER FIVE
CONCLUSION

- The objective of any dairy producer is to produce enough milk, and to generate an income that can sustain the desired life style.
- The present investigation illustrated the following :-
- The balanced ration increased the level of cow milk production more than unbalanced ration.
- The cost milk production for cow fed balanced ration was lower than that of cows fed unbalanced ration.
- The cost of milk production per pound for cow fed balanced ration was lower than that of cows fed unbalanced ration it was almost half of it.

CHAPTER SIX

RECOMMENDATION

All farms should be managed through adopting good management practices. The good management always prefers to exploit its recourses in most rational way to achieve maximum yield at the minimum cost.

The result of this study suggested that using of balanced ration in farm, because it was profitable for dairy producer.

The role of the agricultural extension departments should be strengthened to facilitate the dissemination of scientific knowledge among farmers.

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University of Khartoum –Colleges of Agriculture and Animal Production

Assess the economic Feasibility of Production and the use of balanced ration for dairy farms in Khartoum state.

Survey

Farm name……

Farmer name…….

Educational level …….

Farm location……

Farm area…….

Herd size……...

Cows breed……..

Milking cows number ……..

Dry cows number……

Heifer number …….

Calves number……...

Buildings and Design:-

Structure substantial:

Barn = (area\m)

Design of barn ground: court ( ) earth ( )

Barn wall: pipes ( ) wood ( ) structure ( )

Roof: traditional ( ) zinc ( )

The area which covered by shadow

……

Did it prevent rain? ( )

Farm management:-

Calve care:-

1. Nursing:-

……

2. Calve rearing in small groups or individuals

……

3. Weaning, limited period or leave the calf with his mother to dry. .

……

4. Did calves used in the milking ( ).

5. Did calves vaccination used ( ).

6. Did calves dehorning used ( ).

7 Did hoof trimming used

8. Did there an adequate nutrition ( )

9. Type of nutrition

……

B/ Cleanness and Sanitation:

1. Did building disinfection used ( ).

2. Did dung removal practiced ( )

4. The cleanliness of equipment and Tools ( )

C.Vaccination:-

A/ Afoot and mouth disease.F.and MD. ( )

B/ Black quarter. ( )

C/ Hemorrhagic septicemia H.S. ( ).

D/ Anthrax ( ).

E/ Contagious Bovine Pleuro pneumonia.CBPP ( ).

F/ Render pest R.P ( ).

D/Milking Mechanism:-

A-1/ Machine milking ( ). 2/manual milking ( )

B-Milking hygiene

1/ Udder washing ( ). 2/ milker cleaning ( ). 3/wetting using( )

4/ Use a disinfectant after milking. ( ) 5/ cleaning of equipment ( )

Nutrition: - How dairy cow fed.

Roughage ( ) Concentrate ( ).

Quantity	**Cow number**	**Price**	**Ration formulation**	**Ration/Day**	**Type**

E. How the ration is fed-

According to production ( ).

According to age ( ).

According to physiological status (pregnancy- dry-milking). ( ).

Feeding the dry cows with dairy herd ( ).

Individual ( )

When dry cows fed individually, what kind of ration used.

Cow Number	price	Ration formation	Ration/day	Kind
				concentrate
				Roughage
				Con.+Rough.
				Rough. only

Concentrate and Roughage sources:-

farm	near farms	market	other	
				Concentrate
				Roughage

Is there an agricultural field in the farm?

Area ( ) kind ( )

Is an agricultural field sufficient ( )

Is concentrate ration purchased ( )

The source ( ).

Ration component……

Do molasses used as nutrition? ……

Other additive…….

Fertility:-

1\Methods of heat detection.

A/Observation ( ). B/ Stear ( ). c/Other methods ( ).

2/ insemination system:-

A/Natural ( ). B/Artificial insemination ( ).

3/Do you use hormones? ( )

Why…….

A/ Heat synchronization b/ Treatment ( )

4/ Is there heat repetition ( ).

5/ Other fertility Problems…….

A/ Ovary cysts ( ). b/ Corpus leuteum persistant

6/pregnancy detection:-

A/ Periodic ( ) b/ According to need ( ).

7/ Care through pregnancy period:-

a/ concentrate feeding ( ). b- Isolation ( ).

8/ care through parturition:-

A/ Clean place ( ). B/Maternity stall ( ).

Kind of Parturition. Normal ( ). Difficult ( ).

Is there cases of retain placenta ( ).

9/Herd production efficiency:

Daily, monthly and yearly milk production per cow/pound

High cow……..

Low cow……...

Daily production of the herd ( ). Monthly ( ) yearly ( ).

Milking days/cow/year ( )

10/ non infectious diseases:-

Disease	No. of cases	Treatment	Observations
Ketosis			
Milk fever			

Bloat			
Udder edema			
Others			

11/ infectious diseases:-

Disease	No. of cases	Treatment	Observations
Render pest			
Anthrax			
Hemorrhagic Septicemia			
Foot and mouth			
Foot Rot			
Pneumonia			
Others			

12/ Mastitis:-

Number of cases ( ). The test ……...

Prevention methods:-

Teat dip ( ) Isolation of chronic cases ( ).

Sanitation ( ). Drying ( ).

Medication

……

13/Theleariaisis (tick fever):-

Cases number ( ). Diagnosis ( ).

Medications:……..…….

14/ Brucellosis:-

Abortion cases in advanced pregnancy ( ).

Did herd tested for brucellosis previously ( ).

Did herd vaccinated against brucellosis ( ).

Number of cows isolated due to infection by brucellosis

……..

15/ Internal parasites:-

Did herd checked for internal parasites ( ).

Is there a strategy for internal parasites medication?

……..

Medications:-

……..

16/**External parasites:-**

Is there an external parasites? ( ).

Did spraying for external parasites practiced ( ).

Which drugs used?

……..

Other methods for prevention.

……..

17/ work:-

Laborer Name	Kind	Age	Educational level	Monthly wage

Is there laborer change .yes ( ) no ( ).

Reason……..

Diseases control measurements:-

1/ Sanitation ( ). 2/vaccination ( ).

3/tests ( ) 4/medicament ( ). 5/sepreation ( ).

Nutrition ( ).

18/ Health and economic records of the dairy farm:-

1/Is there any records ( ).

2/ Is there any veterinary clinic in the farm ( ).

3/ Veterinary supervision:-

Veterinarian ( ). Technician ( )

Permanent supervision ( ) Regular ( ) according to need ( )

4- Farm economical costs:-

Item	Year	Week	Day
Farm rent			
Veterinarian salary			
Drugs and Vaccine			
Electricity and Water			
Rations			
Artificial insemination			
Other			

Farm income:-

Item	Quantity(day-week-year)	price
Milk sale		

Calves sale		
Manure sale		
Other		

General Note:-

……

……