AN EVALUATION TO THE FACTORS INFLUENCING MILK PRODUCTION AND DAIRY HERDS HEALTH IN KHARTOUM AND KHARTOUM NORTH TOWNS

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قال الله تعالى:

(وَإِنَّ لَكُمْ فِي الأَلْعَامِ لْعَبْرَةً تُسْقِيَّكُمْ مَمَّا فِي بُطُونَهُ مِن بَيْنِ فَرْثٍ وَدَمٍ لَّبِنَا خَالِصًا سَائِغًا لِلشَّابِئِينَ)

صدق الله العظيم

سورة النحل، الآية (66)
I dedicate this work to the soul of my father, and to my family, my mother,

Sisters and brothers

With love
Firstly, the thanks and praise be to the God, for giving me the strength and patience to achieve this work.

Deep appreciation and gratitude is due to my supervisor Dr. Tawfig Eltigani Mohamed, Department of Preventive Medicine and Public Health- Faculty of Veterinary Medicine, University of Khartoum, for his constructive guidance and encouragement through out this work.

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I would like to express my thanks to my family, for their unfailing support and encouragement. I offer my thanks to my colleagues and my friends, for their continuous encouragement.
The presented work was carried out in 79 farms at Khartoum State, in Elsabil and Elshigla collections in Khatroum and Khartoum North towns respectively.

Milk production is one of the essential activities not only in khartoum state but rather in all the country. And that because among the main food stuffs, milk has been identified to be of particular interest with regard to alimentation and health. Milk and dairy products have always enjoyed a healthy perception to the consumer as pure products that are essential for health well-being.

In Khartoum state the demand for food is increasing due to its growing population besides the increasing of the prosperity.

Hence, the study aimed to identify the factors which have impacts on milk production in Khartoum state.

A comprehensive data base on milk production and performance at farm level has been collected and collated by using questionnaire.

Data and information obtained were statistically analyzed using Pearson correlation coefficient. They revealed many factors of concern:

1. Feeding system

2. Health care and diseases
3. Farm management which involve: housing system, breeding system, recording system, culling system and evaluation of performance in the farm etc.

4. Personnel and economical impacts in the study samples.

the source and type of the ration which presented to the animal, furthermore, the study showed the great impact of the cost of the ration on the total production cost as well as on the maximum productivity.

About health care and diseases which consider one of the factors that directly affect on milk production.

Also the study stressed on some of the wrong practices in milk farms that owners used to such as using drugs without technical consultation, neglect of the regular vaccination and the periodic laboratory examinations to both of milk and animals. All these things and others may be attributed to the lack of veterinary extension and the shortage of the veterinary services.

In regard to farm management, the study pointed to the existing records which lack accuracy, and the improperly designed housing facilities. Furthermore, the study indicated that the animal owners depend on the natural service as only way for insemination, and this in turn reflects the urgent need for transferring appropriate knowledge and technologies such as artificial insemination(A.I) technology in order to save money and effort and increase the productivity of milk. Along with this the study
confirmed that the cross-breeding system in most of the farms is carried out traditionally without any technical systematic method. The study showed that there is no proper reliable program for culling in most of the milk farms and that in turn reflects on the total cost and profitability in such farms. And because most of the owners do not care about keeping records, accordingly, records have no value in evaluation herd performance trends and management strengths and weakness, consequently, they depend on their observations and the daily income and the expenses to evaluate their business.

Concerning personnel, the study focused on the effect of the manpower and their dominated role in the milk farms. Labors not only do the manual work, but rather they supervise on the total operation, that is why they share in decision-making, the thing that has a great impact on milk production.

On the conclusion, the study recommended that scientific researches should be planned and directed according to the needs and the requirements on different fields.

Also more studies and researches on the factors affecting milk production, performance of the animal, and trials to solve the problems related, should be carried out.

Rather the study focused on the role of the extension system in developing milk production, it has been evident that there is a lack of
adequate knowledge and insight and in some cases there is an incorrect information because of limited experience and appropriate knowledge. So in order to promote milk production through transferring knowledge and technologies, it will be necessary to create an effective extension system with a strong linkage, with the research centers and the relevant institutions.

Therefore, at the end of the conclusion, the study presented some aspects of the required extension work on milk production in Khartoum state.
ملخص الاطروحة

الدراسة هذه أجرت مجمع كل في بحر النيل شرق السيول وجمعت النباتات الناتجة.

كثير على ومنتجاتها النباتات تتفوق الغذائية العناصر عليها بنحو الغذائية ضرورية الأمينية الأحماض التي يحتوي وآليتها، بروتين بينها ورمي يتم في الاستهلاك السليم أمرًا من نتاجاتها يجعل منا مثلى سكانية تزايد أكثر النباتات أمرًا من النمو الإنتاجية والأنشطة الحيوانية الإنتاجية.

أجرت في مزرعة زرية (أعلاه المذكورين الجمعيي) 79 عائلة.
يتم تحليل وتقديم الإحصائيات وباستعمال البيانات وارتباط بيجرنس مع عوامل البحث، حيث يتم تصميم جداول أخرى بيانية.

- يشمل إيجاد الرتبة، بيجرنس بين التغيرات وتحديد المعرفة وذل تلك الإنتاج.

1. التعبئة الغذائية: التقييم والعناية بالجهة، حيث يمكن أن يتم تقديم إنتاج الألبان في ساحة تأثير الجسم، حيث يمكن أن يتم تقديم الثقة الغذائية.

2. العناية والأمراض الصحية: يتم تقديم الأمراض في صحة الألبان، حيث يمكن أن يتم تقديم الأمراض في صحة الألبان.

- يتم تقديم المشاكل فيPt-No1

6. التعبئة الغذائية: يتم تقديم الإنتاج في ساحة تأثير الجسم، حيث يمكن أن يتم تقديم الثقة الغذائية.

7. العناية والأمراض الصحية: يتم تقديم الأمراض في صحة الألبان، حيث يمكن أن يتم تقديم الأمراض في صحة الألبان.

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• توجيهات في دلالة عدد الأمراض في البيئية

• استشارة أي دونما للأمراض

• الاستخدام

• الأمراض ضد للحيوانات السنوية بالتحصين

• وراء الأفعال تنمية الأداء

• إجبار أو إجلاء أو إغفال البيطري

3. الأفعال مزرعة داخل النظام -:

• النظام

• الرسالة

• الخصخصة

• إدارة

• التنظيم

• سجل

• النمو

•-induced

• معاملة

• النمو

• الثروة

• الطاقة

• بسبب

• الحيوان

• الفحص

• عليها

• الإشراف

• على

• العادة

• هذه

• الاستشارة

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• مثال

• الحالة

• الفحص

• مثلاً

• الفحص

• مثلاً

• الفحص

• مثلاً
لا يمكنني قراءة النص بشكل طبيعي من الصورة المعदة.

يرجى تقديم نص يمكن قراءته بشكل طبيعي.
لا توجد نص يمكن قراءته بشكل طبيعي من الصورة المقدمة. يرجى تقديم نص يمكنني قراءته بشكل طبيعي.
CONTENTS

PAGE

Dedication ---------------------------------------------------------------i
Acknowledgement----------------------------------------------------------ii
Abstract (English)--------------------------------------------------------iv
Abstract (Arabic)--------------------------------------------------------viii
Contents---------------------------------------------------------------xiii
List of tables----------------------------------------------------------xiv
List of figures----------------------------------------------------------xv
Introduction-----------------------------------------------------------1
Chapter one: Literature Review-----------------------------------------5
Chapter two: Materials and Methods:
  1. Study area---------------------------------------------------------18
  2. Method------------------------------------------------------------19
Chapter three: Results---------------------------------------------------24
Chapter four: Discussion-------------------------------------------------57
Conclusion & Recommendation------------------------------------------64
Extension Work Aspects-----------------------------------------------65
References-----------------------------------------------------------68
# LIST OF TABLES

<table>
<thead>
<tr>
<th>NO.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The way of insemination</td>
<td>52</td>
</tr>
<tr>
<td>2.</td>
<td>Presence of special places for parturition</td>
<td>52</td>
</tr>
<tr>
<td>3.</td>
<td>Presence of quarantine places for isolation sick animals</td>
<td>52</td>
</tr>
<tr>
<td>4.</td>
<td>Veterinary supervision in the farm</td>
<td>52</td>
</tr>
<tr>
<td>5.</td>
<td>Vaccination program in the farm</td>
<td>53</td>
</tr>
<tr>
<td>6.</td>
<td>Periodic laboratory tests in the farm</td>
<td>53</td>
</tr>
<tr>
<td>7.</td>
<td>Milk check-up test in the farm</td>
<td>53</td>
</tr>
<tr>
<td>8.</td>
<td>Method or way of recording in the farm</td>
<td>53</td>
</tr>
<tr>
<td>9.</td>
<td>Owners opinion in recording system</td>
<td>54</td>
</tr>
<tr>
<td>10.</td>
<td>The daily farm expences</td>
<td>54</td>
</tr>
<tr>
<td>11.</td>
<td>Correlation table (11)</td>
<td>56</td>
</tr>
<tr>
<td>12.</td>
<td>Correlation table (12)</td>
<td>56</td>
</tr>
<tr>
<td>13.</td>
<td>Correlation table (13)</td>
<td>56</td>
</tr>
<tr>
<td>14.</td>
<td>Correlation table (14)</td>
<td>56</td>
</tr>
</tbody>
</table>
**LIST OF FIGURES**

<table>
<thead>
<tr>
<th>NO.</th>
<th>Figures Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Farms location</td>
<td>25</td>
</tr>
<tr>
<td>2.</td>
<td>Farms areas</td>
<td>26</td>
</tr>
<tr>
<td>3.</td>
<td>Number of laborers</td>
<td>27</td>
</tr>
<tr>
<td>4.</td>
<td>Labors education levels</td>
<td>28</td>
</tr>
<tr>
<td>5.</td>
<td>Livestock population</td>
<td>29</td>
</tr>
<tr>
<td>6.</td>
<td>Animals breeds</td>
<td>30</td>
</tr>
<tr>
<td>7.</td>
<td>Farms animals sources</td>
<td>32</td>
</tr>
<tr>
<td>8.</td>
<td>Food type</td>
<td>33</td>
</tr>
<tr>
<td>9.</td>
<td>Food cost</td>
<td>34</td>
</tr>
<tr>
<td>10.</td>
<td>Animal husbandry systems</td>
<td>35</td>
</tr>
<tr>
<td>11.</td>
<td>Housing system</td>
<td>36</td>
</tr>
<tr>
<td>12.</td>
<td>Common diseases in farms</td>
<td>37</td>
</tr>
<tr>
<td>13.</td>
<td>Treatment and drug use</td>
<td>38</td>
</tr>
<tr>
<td>14.</td>
<td>Mastitis incidence</td>
<td>39</td>
</tr>
<tr>
<td>15.</td>
<td>Dealing with milk during withdrawal period</td>
<td>42</td>
</tr>
<tr>
<td>16.</td>
<td>Culling due to mastitis</td>
<td>43</td>
</tr>
<tr>
<td>17.</td>
<td>Cost of mastitis treatment</td>
<td>44</td>
</tr>
<tr>
<td>18.</td>
<td>Culling program</td>
<td>45</td>
</tr>
<tr>
<td>19.</td>
<td>Causes of culling of animals</td>
<td>46</td>
</tr>
<tr>
<td>20.</td>
<td>Occurrence of recording system</td>
<td>47</td>
</tr>
</tbody>
</table>
21. Types of records .................................................................................. 48
22. Daily milk yield average ........................................................................ 49
23. Way of milk distribution ....................................................................... 50
24. The current milk price .......................................................................... 51
INTRODUCTION

Quite apart from any humanitarian considerations, it is in man's best interest to keep his livestock in health and capability to reach their maximum capacity.

In order that an animal may give its best, two separate factors are required:

1. The circumstances must be adequate for the animal to maintain itself in health.
2. And it must also be capable of taking in and utilizing the food that is given to in excess of that which it requires merely to exist.

It is extremely difficult to define health, but in practical terms a healthy animal grows, reproduces, and behaves in a manner which has come to be regarded as normal for its species and type.

Domestic food animals are asked to do more than merely survive; they are expected to grow rapidly or to produce far more milk than would be required by the young.

Sequently, because man demands from the animals under his care are so much the disease is very important.

Blatant disease is usually easy to recognize; not only do several animals in the same herd become sick but the signs such as diarrhea, distress in breathing, or pain are self-evident.

This is not to say the cause is easily diagnosed, but here we are only discussing the departure from health even when only one animal is severely ill, we find little difficulty in recognizing the fact since we too can become sick, and we can identify with the animal.

However, the chronic slight departure from health which makes the animal become what is usually known as "a poor doer" that causes most concern.
The only way to know when an animal is not behaving according to expectation is to measure its performance constantly and by comparison with normal or average expected production.

At the present time maintaining a healthy herd is a constant challenge to dairy producer. Each year an average of 20 to 25 percent of dairy cows are culled due to poor reproductive performance or other health problems as reported by the Rice, Duane et al. (2005).

Many factors influence the health and performance of a dairy herd. These include the entire scope of management factors from "on farm" activity to the associated business and financial interactions.

All of these are controllable but require knowledge and consistent effort by the producer.

In the technical production aspects of a dairy development strategy, five inter-related issues need attention.

These are:

1. The supply of dairy stock
2. Animal health
3. Fodder system
4. Marketing arrangements
5. And training of farmers

It is important to stress the inter-related nature of these issues. For example, the introduction of upgraded stock without improving the management or the feed regime may leave the farmer worse off than before. Producers must address dairy animal health (Calves, replacement heifers and cows), reproductive performance, genetics, nutrition and udder health (mastitis control) to be successful.

Accordingly, the maintenance of a healthy and profitable reproductive status in the dairy herd can be accomplished by proper management. Included in these management factors are good breeding techniques, a balanced, competent feeding program, sufficient water supply, accurate records. Also hygiene, and a veterinary service to
minimize reproductive inefficiency and disease. A close cooperative approach between the producer, nutritionist, and the veterinarian is necessary for the program to be effective.

Any business needs planning and strategy, so in order to establish an effective program, a thorough understanding of the entire reproductive history in the herds is a necessity.

Accurate herd and individual cow histories are essential, and these are available only through reliable and up-to-date records.

Hence, records in a farm focus attention on the management strengths and weakness.

Along with that, the breeding efficiency of a dairy herd cannot be maintained at a high level without proper nutrition.

Therefore, to attempt reproductive improvement when nutritional balance is incorrect is futile. Diets must be carefully balanced for protein (escape or "by-pass" and degradable protein), energy, minerals, and vitamins to promote good reproductive performance.

On the other hand, variations in animal production are more highly correlated with food intake than other characteristics of the diet, such as energy or protein concentration.

Consequently to obtain the best potential production, adequate, supplemented foods must be supplied.

In addition to that, a good working relationship between the veterinarian and producer is essential to develop a successful program in order to provide the veterinary services needed.

These services must be done at the proper time and place in a systematic, coordinated effort to determine potential problems and to prevent them before they occur.

However, to increase milk production and improve its quality and achieve the required food security, there is an urgent need to know all the information that concern, at the level of the farm and in the particular district as a whole. So the availability of such information on the influence
of the different factors on the milk production would be of a great benefit to animal producers and also help on adopting the polices and the strategies that promote this sector.

The objective of this study was to evaluate the effect of some environmental and management factors on milk production and dairy herds health.

In the available literature there does not appear to be any record of investigating the influence of the abovementioned factors on milk production, therefore, the present work endeavors to make such a useful contribution and also hope the axises that the study was pointed to, be a target for more researches.

The present study focused on that animal groups which kept together in organized collections (zaribas) around Khartoum and Khartoum north, in attempt to give information and draw attention on some animal production aspects which could form basis for future studies and programs in purpose of developing animal production sector.
CHAPTER ONE
LITERATURE REVIEW

There is a wide range of environments in Africa: cool temperature highlands, humid lowland tropics, rangelands and well-watered savanna. This has resulted in great diversity and localization of breed types. Most livestock in Africa are kept by smallholders, whether on mixed crop-livestock farms or in pastoralists' herds. Commercial ranches are relatively unimportant except in a few Southern countries. The major breeds of African cattle can be classified into three main groups: The humped zebu of the North, the hump less or taurine breeds of the tsetse-infested zones and the small cervico-thoracic-humped Sanga of the Southern and Eastern savanna.

Although indigenous African cattle are multipurpose animals, cattle in Africa are kept primarily for milk production. In pastoral societies, milk is the key product, with meat of only secondary importance. On small holder subsistence farms, milk is universally important. Manure usually plays an important role in crop production, draught power and beef production are of localized importance, and all livestock play role as a cash reserve and as a source of income.

Well-defined beef and dairy industries are not common although they exist to some degree around urban centres. Most stock are kept under extremely simple management conditions and receive little supplementary feed or health care. The ability to cope with environmental stress is the prime criterion for survival. Not surprisingly, Africa's livestock are late maturing, slow growing and modest milk producers. These animals do, however, respond well to improvements in their environment.

The poor weaning weights that commonly occur are the result of the off-take of milk for human consumption, this reduction in live weight at weaning is never made up. As a result, calf mortality is greatly increased, sexual maturity delayed, mature body weight reduced and efficiency of overall feed use greatly depressed.
Inadequate nutrition and the disease situation generally favour the use of the Bos indicus breeds of cattle in Africa. Increasingly, however, improvements in the meat and milk production of Africa's livestock are being sought through cross breeding with imported breeds. Relatively modest increases in output can lead to large gains in the efficiency with which feed resources are used, and this underlies the persistent attempts to upgrade the *B. indicus* breeds by using imported B. Taurus breeds with higher additive genetic performance for meat and milk production. Exotic cattle introduced into Africa also fall into three broad groups-zebus such as the Sahiwal and Brahman types from Asia, European beef and dairy breeds, and zebu exotic hybrids such as the Bonsmara and santa Gertrudis. Under traditional management, indigenous breeds of cattle are more productive than exotic breeds. However, in higher altitude and more temperate areas of sub-saharan Africa, crossbred cattle can outyield indigenous stock fourfold, provided that modest improvements are made in their management and nutrition. Maintaining genetic stability in these crossbreds is, however, a major problem. Making better use of local feed resources, particularly poor quality feed, at the small-farm level is a promising strategy for increasing milk production.

Three main approaches to dairy development are in use: large parastatal farms, medium-sized dairy farms in peri-urban areas and organized milk collection from subsistence farmers. In each system, output is constrained by the restricted supply of dairy stock, poor animal health, inadequate feeding, poor marketing facilities and lack of extension and adequately trained personal.

Animal health problems are closely linked to the kind of environment in which the herd is kept, the management methods used and to genetic factors related to disease resistance in the animal population. Closed management systems, in which no animals are brought into the herd from outside sources, greatly reduce the likelihood of infection by many diseases, and viral and bacterial infections that are spread by contact can be
prevented. This offers an alternative to the strict use of vaccines and usually protects the herd from the severe effects of such diseases as infectious bovine rhinotracheitis, mucosal disease and, probably, salmonellosis.

Such persistent problems as brucellosis and tuberculosis can be controlled by a combination of eliminating infected animals and maintaining a closed herd, by Brumby and Scholtens (1986).

But in small dairy herds in warm climates, vector-borne and parasitic disease are the most common health problems, and the strict environmental controls necessary to eliminate these are not practicable. Many of these diseases cannot be prevented and treatment or control is expensive.

Disease is an important constraint on all forms of livestock production and especially for calves, which frequently suffer from respiratory and enteric diseases. It is also evident that unattractive prices and in appropriate policies frustrate production increases in many circumstances. So the success of any dairy development scheme depends to a large extent on marketing and pricing arrangements. The prices received by farmers for certain products largely determine which activities are undertaken on the farm. An efficient milk collection and distribution system to bring milk from the farmer to the consumer is a critical factor in dairy development.

Sudan possesses in the cattle an excellent basic material capable of rapid response to selection. Bayoumi (1954) found that the Kinana cattle are good milk producing animals. The big variations in the yield, among the individual cows show that there is a big chance for improvement through selective breeding.

This type of Sudan cattle could be of considerable value in improving milk production in all the dry tropics, they are superior as milk producers to other African types.

Khartoum State lies in sub-sahara (Semi desert) area between 15.8° to 16.45° latitudes North to the Equator and 31.45 to 34°.25 longitude, area of about 20971 Sq k and livestock population come to 222.00 heads
Generally the systems of husbandry in Khartoum State followed two sectors according to the degree of natural pasture exploitation: traditional and modern sectors. In the traditional sector, livestock usually held under many systems such as nomadic (pastoral) system, and housing ranches in which animals are held under village conditions. These two systems either totally or partially depend on natural pasture. In the modern sector, animals are fed on concentrate and green forage and animal production depends on capital factors, land, labour and makes the better use of technology in management, rearing and feeding of animals.

In particular the systems of animal production in Khartoum State include:

1. Open grazing system: which depends mainly on grazing of rangelands and pastures, crop residues and grasses along roadsides. This system of husbandry practiced on rural areas and the extremities of the state.

2. Housing ranches: occur in villages and towns as well. Cattle that kept under this system are fed and managed in the houses or close to.

3. Modern system: which is a recent system, that provides to a certain extent adequate nutrition, improved pens and contact veterinary care.

4. Organized collective farms or units of milk production (assemblies): it is a new one established by government and small holder farmers or owners. These collective farms gather small dairy-producers and land-less farmers in one area in order to afford them some facilities and services such as vaccination, treatment …etc, see table No. (III), (Ref. Ministry of Agriculture and Animal Resources and Irrigation). This system aims to encourage and develop such type of investment and to improve the housing and feeding regime and enable them using
new better dairy technology and to establish substantial centers for milk collection.

In Khartoum State there are 13 collective farms table No. (III) distributed on Khartoum, Kh. North and Omdurman towns. They contain 100 to 150 thousands dairy cattle. The daily milk production of individual cow ranging from 5-25 kg, and this difference in animals numbers is due to the inaccurate census, Elkhidir et.al (2005) suggested that the obvious variation in cows production of milk yield is an evidence of the variance between cattle breeds and their species, the system followed in their management, housing and feeding regime, by Elkhidir, et.al , (2005). Milk Production is one of the essential activities in Kh. State which has a substantial intensive, human population comparing with other states, consequently, milk and its products consider as an essential consumer commodities in the state. This increasing demand for milk is due to its nutritive value whereas milk is nutritive rich food containing protein, fat, lactose, vitamins and minerals, as well as enzymes, cells, hormones and immunoglobulins. It is the exclusive source of nutrients for the neonates and it also represents a high grade source of dietary nitrogen and indispensable aminoacides for adults. Apart from the nutrition, various physiological roles of various milk components have been identified, by Rajan Sharma and Y.S. Rajput, (2006). Cattle consider as the main source of milk in Khartoum State, it offers about 94% of the total available amount, followed by goats and sheep which offer the rest of the quantity besides the imported liquid milk which come from other neighboring states such as the Gezira State and white Nile state, in addition to the imported skim milk powder. The dairy stock in Khartoum state is represented by indigenous Kinana and Butana cattle besides exotic, crossbred cattle, in addition to Nobian goats. As mentioned in table No. (I) the total numbers of cattle in Khartoum state reach 222,000 heads, the dairy one from this numbers is about 152,000 head (86.5%), the average milk production of individual unit (cow) is 2.8 tons differs according to the
breeds; exotic 4.3 tons, cross 2.6 tons and the local 1.6 tons ,{Elkhidir, et.al ,(2005) ; Saeed and Hasabel Rasul ,(2005)}
Eisawi, et.al, (1996) determined many problems and constraints that face milk production , such as :-

1. Poor genetic performance of the local stock.
2. Un availability of production inputs
3. Limited availability of Veterinary services
4. Problems concern with animal husbandries such as housing, herd structure, breeding and reproduction management.
5. Keeping of records
6. Insufficient veterinary extension
7. Difficulties faced milk marketing and price structure.
8. In adequate, appropriate transport facilities
9. Lack of adequate capital for investment, besides unavailability of accurate information and censuses about actual and available potential investment in dairy sector, which allow to plan ahead and manage dairy herd to the optimum level.
10.Limited availability of adequate balanced food supply for dairy animals.
Saeed and Hasabel Rasul (2005) added to the above- mentioned constraints the following :
- Incompetence of finances available to provide dairy units and production inputs.
- Lack of capital invested in dairying
- Retrogression of the methods of milk handling, collection and marketing.

There is a distinct relationship between good dairy health and profits in dairying . Currently , dairy herd health programs are also called "Production Medicine" or "Total Quality Management" "TOM" . These programs emphasize disease prevention by providing proper nutrition , total management efforts and a clean , dry comfortable environment, along with
properly designed housing facilities, necessary dairy equipment, manure management, etc. (Ref. Rice, Duane, et al., 1996).

Fagiri and his colleagues (2000) mentioned some problems concern with animal health include some diseases which have an effect on animal production such as mastitis, deficiency diseases e.g. milk fever, diseases of calves, zoonotic diseases e.g. brucellosis and T.B., also they pointed to the system of husbandry and management as an effective factor on dairy cow production.

No herd of cows can be profitable unless it is healthy. Now that disease such as tuberculosis and brucellosis have been virtually eliminated diseases precipitated by husbandry errors are becoming relatively more important. Good husbandry is, therefore, now the greatest single factor in maintaining a healthy herd of dairy cows and so the standard of husbandry can mean the difference between economic success or failure.

Management and feeding methods are the husbandry factors to be considered; (By King, J.O.L. 1981).

Abu Eisa, (2000) explained the importance and the effect of nutrition on milk production, he mentioned that the genetic improvement affect 25% while the nutritional improvement affect 55% on animal growth and productivity.

Abdullah, (2002) discussed the environmental factors and their effects on milk production, he stressed on the importance of making the optimum use of labour, land and capital in order to achieve the optimum profit and legal gains.

King, J.O.L. (1981), reported that farmers with large herds can increase profits because certain investment items are shared by a larger number of cows. However, economies in housing costs can lead to overcrowding of cows and undesirable environmental conditions.

Labors saving methods are being introduced so that an increased number of cows can be tended and milked per stockman. But when large number of cows are kept per man shortage of staff time may mean that the cows can
not be given adequate individual attention and the cleaning of buildings and milking equipment may be performed inefficiently.

Abdullah, (2002) explained the effect of the climatic factors on animal productivity, he also underlined the importance of provision of food supply, health care and diseases investigation, herd rearing and management which include organization of herd structure, identification, record keeping, calves rearing, culling and herd replacement programme, and milking and dairy routine.

Esslemont et al, (1988) talked about the fertility management in dairy cattle and its relation with profitable milk production, they focused attention on the importance of lifetime performance, the use of artificial insemination (A.I) or natural service, planned animal health, role of veterinarian, the awareness and responsibilities of the herd owner, records and their important role in making appropriate decisions in a proper time, also their effective role in the evaluation and determination of the degree of targets achievement.

Neglect of records keeping, computer use and management practice information is a mistake that can lead to long – term losses in herd performance and profitability, by Rice, Duane, et.al (1996).

Khalil (2000) highlighten the importance of using modern and appropriate techniques in milk production and processing development, and also in reduction of production cost. He mentioned the traits of computer programmes in ration formulation and preparation, quality of dairy management, records control programmes, financial performance control programmes etc..

Elkhidir, et.al (2005), talked about the available technologies in concern of developing milk sector such as recording system, artificial insemination (A.I) and improvement of feeding system. And due to the traditionalism of milk sector in Khartoum state and in Sudan generally, there is a necessity to transfer such technologies to the producers through the extension and by the following means :-
• Field visits to the dairy farms.
• Creation of model farms among the collective milk farms.
• T.V and Radio programs.
• Veterinary services.
• The legislation and laws which organized the milk sector.
• Financial and banking facilities.
• Books, demonstrative leaflets and posters.

And as Eltahir and Yaagoub (2005) mentioned, the extension system reforms the technology or the research information in order to be simplified then presented to the target group in understood and perceptible form, through a suitable communication canal.

Extension is an effective instrument only when combined with others, such as research, provision of inputs and credit and marketing. It can teach farmers how to produce crops and animals in the most profitable way, as well as how to organize themselves in cooperatives and other farmers organization.

As Elkhidir, et.al (2005) and Eltahir, et.al (2005), pointed, the present extension system needs activation and should be support by qualified staff and extension equipments such as audio and visual tools, as well as sufficient transport means. Also the present extension system has a weak linkage with research centers and it lacks the coordination with other institutions.

Promotion in the extension services is based mainly on staff members’ performance, also an effective linkage between research centers and extension system is quite important for developing of the extension in order to achieve its goals.
Table (I): Estimates of livestock population in Khartoum State for year 2005 (settled animals). (Per head)

<table>
<thead>
<tr>
<th></th>
<th>Cattle</th>
<th>Sheep</th>
<th>Goats</th>
<th>Camels</th>
<th>Poultry</th>
<th>Others</th>
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<tbody>
<tr>
<td></td>
<td>222,000</td>
<td>445,000</td>
<td>726,000</td>
<td>5,500</td>
<td>9,500,000</td>
<td>30,000</td>
</tr>
</tbody>
</table>

Ref. Saeed, Ministry of Agriculture and Animal Resources and Irrigation.

Table (II): Numbers of livestock population which are brought to the state annually for trade purposes (per head)

<table>
<thead>
<tr>
<th></th>
<th>Cattle</th>
<th>Goats</th>
<th>Sheep</th>
<th>Camels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>300,000</td>
<td>300,000</td>
<td>2,500,000</td>
<td>5,000</td>
</tr>
</tbody>
</table>

Ref. Saeed, Ministry of Agriculture and Animal Resources and Irrigation.
<table>
<thead>
<tr>
<th>Collective farm name</th>
<th>Site</th>
<th>No. of cows</th>
<th>Milk production (liter)</th>
<th>Marketing</th>
<th>Services</th>
<th>Available facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahlab 2</td>
<td>Nile East</td>
<td>5039</td>
<td>50.000</td>
<td>Through mediators+ factories delivery</td>
<td>Clinic, vaccination, private pharmacies</td>
<td>A.I Not Carried</td>
</tr>
<tr>
<td>Mahlab3</td>
<td>Nile East</td>
<td>2033</td>
<td>20.000</td>
<td>Through mediators+ factories delivery</td>
<td>Clinic, vaccination, private pharmacies</td>
<td>A.I Not Carried</td>
</tr>
<tr>
<td>Elrudwan</td>
<td>Omdurman</td>
<td>6798</td>
<td>60.000</td>
<td>Through mediators</td>
<td>Clinic, vaccination, private pharmacies</td>
<td>A.I Not Carried</td>
</tr>
<tr>
<td>El sabil</td>
<td>Khartoum &quot;Gabalawia&quot;</td>
<td>2000</td>
<td>-</td>
<td>Through mediators</td>
<td>Clinic, vaccination, private pharmacies</td>
<td>A.I Not Carried</td>
</tr>
</tbody>
</table>

*Table No. (III): Collective farms list in Khartoum state*
<table>
<thead>
<tr>
<th>Collective farm name</th>
<th>Site</th>
<th>No. of cows</th>
<th>Milk production (liter)</th>
<th>Marketing</th>
<th>Services</th>
<th>Available facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elshigla</td>
<td>Nile East</td>
<td>1657</td>
<td>15.000</td>
<td>Through mediators</td>
<td>Clinic, private pharmacies</td>
<td>Not Carried</td>
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<td>Ext.school</td>
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<td>Elazhari</td>
<td>Gabalawlia</td>
<td>3952</td>
<td>-</td>
<td>Through mediators</td>
<td>Clinic, vaccination, private pharmacies</td>
<td>Not Carried</td>
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<td>Track way</td>
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<td>Gabra *</td>
<td>Khartoum</td>
<td>6917</td>
<td>30.000</td>
<td>Through mediators</td>
<td>Clinic, vaccination, private pharmacies</td>
<td>Not Carried</td>
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<td>Omdiraiwa*</td>
<td>Kh. North</td>
<td>1017</td>
<td>10.000</td>
<td>Through mediators</td>
<td>Vaccination</td>
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<td>Elwifag</td>
<td>Kh. North</td>
<td>8432</td>
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<td>Through mediators</td>
<td>Vaccination</td>
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<td>Elsilate* south</td>
<td>Nile East</td>
<td>13.948</td>
<td>-</td>
<td>Through mediators</td>
<td>Vaccination</td>
<td>Not Carried</td>
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<tr>
<td>Collective farm name</td>
<td>Site</td>
<td>No. of cows</td>
<td>Milk production (liter)</td>
<td>Marketing</td>
<td>Services</td>
<td>Available facilities</td>
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<td>Animal health</td>
<td>A.I</td>
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<td>334</td>
<td>-</td>
<td>Through mediators</td>
<td>vaccination</td>
<td>Not Carried</td>
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<td>Wadi soba*</td>
<td>Nile East</td>
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<tr>
<td>Elsillate North *</td>
<td>Nile East</td>
<td>12.600</td>
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<td>Through mediators</td>
<td>Vaccination</td>
<td>Not Carried</td>
</tr>
</tbody>
</table>

Ref. Ministry of Agriculture and Animal Resources and Irrigation – Animal Production Department – Khartoum state.
CHAPTER TWO
MATERIALS AND METHODS

1. Study area :-
This study was carried out in Khartoum State, which occupies the centre of the Sudan, between the two Niles, the white and blue Nile.

The state was divided into three major towns: Khartoum, Khartoum north and Omdurman. It is bordered by seven states: River Nile and the Northern states in the North, Northern Kordofan State in the west, White Nile and Gazira states in the South, Elgadarif and Kassala states in the East.

The average amount of precipitation ranging from 139 to 157 mm annually. Water available from the blue and white Nile besides the main Nile in consequence of that such conditions, there is a proper environment available for animal production.

Khartoum state has an advantage of being inside the disease free zone area, also its high intensive human population create an excellent chances for animal products marketing, in addition to the availability of the technical and scientific experiences in different fields. As mentioned before in Khartoum state there are 13 organized collective farms - some of them are not functioning yet - including the traditional small milk producers and the small holder farmers. Milk production in Khartoum state at the present time is represented by :-

1. Big companies as Arabic company, Blue Nile Company (Capo) and Khartoum Company for milk products etc.

2. Greater and small milk producers who are collected together in the above mentioned organized collective areas or farms, who represent the hope in developing milk sector in the state.

3. Small milk producers, who work in what is known as Eldikak, and the broad basis in Khartoum state extremities.

4. Also there is productive families who depend on goats and sheep flocks to satisfy their needs and market the surplus milk to the neighbours.

5. Imported milk either liquid or skim powder, in addition to the recompounding imported milk (Saudi milk)

6. Cooperative milk producers as in Kuku project.
The above-mentioned collections of farms resemble - to a certain extent - each other in the surrounding environmental conditions and in such available facilities, consequently, any of these collections could reflect the general view of the milk production situation in all. From these collection of farms, the study was carried out in two of them:

a. Elsabil organized collection which lies in south Khartoum in Soba West area.

b. Elshigla collection farms which lie in East Nile, south of Elhag yousif district.

2. Methods :-

There are many key factors influencing milk production in dairy herds in Khartoum state. In order to identify these factors at farm level, a comprehensive data base on milk production has been collected, from 79 units in two groups of units in Khartoum and Khartoum North (Nile East), as follows: 39 units from Elsabil collection and 40 units from Elshigla collection.

The information has been collected through questionnaire which is designed to investigate on manpower, herd structure and supply, feeding system, husbandry system, health care,…etc. (see the accompanied questionnaire).

The questionnaire has accomplished randomly among available sample units. The information has been grouped and categorized, then the data which were obtained undergone processing and standard statistical analysis.
Questionnaire On Dairy Farms Management In Khartoum State

1/ Farm owner's name:

2/ Place:

3/ Province or district:

4/ Farm area:

5/ Number of labors:

6/ Educational level:
   1. Literate (  )
   2. Illiterate (  )

7/ Number of animals in the farm:

<table>
<thead>
<tr>
<th>Dairy cows</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows in milk</td>
<td></td>
</tr>
<tr>
<td>Dry cows</td>
<td></td>
</tr>
<tr>
<td>Calves</td>
<td></td>
</tr>
<tr>
<td>Bulls</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

8/ Animal breeds in the farm:
   i- Local    ii- Foreign    iii- Cross-breed

9/ Source of the animals in the farm:
   i- Farm-breed   ii- Purchased

10/ From where does the animals purchased:

11/ What are the standards for selecting the purchased animals:


12/ Types of animal feed used:
 i-Roughage     ii- Concentrates     iii-Others

13/ Sources of animal feed:
 .................................................................................................................

14/ Cost of the feeding:
 i-High     ii-Low     iii-Reasonable

15/ System of husbandry practiced:
 i- Semi closed     ii- Open (outdoor)     iii- Both

16/ System of housing (type of pens):
 i- Separated     ii-Mixed

17/ Type of service:
 i-Natural     ii- Artificial (A.I)

18/ Is there specific place for labour:
 i- Yes     ii- No

19/ Is there a quarantine for isolating sick animals:
 i- Yes     ii- No

20/ The common diseases in the farm:
 i-     ii-     iii-

21/ What are the disease control procedures:
 i-     ii-

22/ Is there avet. Supervision in the farm:
 i- Yes     ii- No

23/ What are the diseases against which you vaccinate animals:
 i-     ii-     iii-

24/ Is there any mastitis incident in the farm:
 i- Yes     ii- No

25/ Type of treatment used for it:
 .................................................................................................................

26/ Cost of mastitis treatment:
 i-High     ii-Low     iii-Moderate
27/ Care taken for the withdrawal period of the drug when treating lactating animals:

……………………………………………………………………………………………………

28/ Cause of death in the farm:

……………………………………………………………………………………………………

29/ Number of animal culled for mastitis per year:

……………………………………………………………………………………………………

30/ Types of laboratory investigation used:

……………………………………………………………………………………………………

31/ Milk check-up, is it taken in the farm:

i- Yes     ii- No

32-Causes for culling:

i- Low production     ii- Low fertility     iii- Others

33/ Methods of culling:

i- Sale     ii- Slaughtering     iii- Condemnation

34/ Do you use farm records:

i- Yes     ii- No

35/ Type of records used:

……………………………………………………………………………………………………

36/ What is the daily average of milk production:

……………………………………………………………………………………………………

37/ Do you keep records for daily or weekly or monthly milk production:

……………………………………………………………………………………………………

38/ Who purchase the milk from the farm:

……………………………………………………………………………………………………

39/ Milk price: ………………………………………………………..

40/ Is it profitable:

i- Yes     ii- No

41/ Time for milk sale:

……………………………………………………………………………………………………

42/ What is the daily running cost in the farm:

……………………………………………………………………………………………………
43/ How do you consider record keeping:
   i- Useful for follow-up   ii- Useful but tedious
   iii- Useful but time consuming   iv- Others

44/ Record program used:
   i- Manual   ii- Computerized

45/ How do you evaluate the performance in the farm:

   ........................................................................................................

46/ According to your evaluation, do you try to elaborate things or make change for
   improvement of the production:
   i- Yes   ii- No
CHAPTER THREE
RESULTS

As shown in fig. (1) Study was carried out in Khartoum and Khartoum North, 39 farms in Khartoum and 40 farms in Khartoum North. The areas of the investigated farms ranging from 300 sq m to 3600 sq m. Most of the examined farms areas fall in range of 751sqm -1500 sq m category , as explained in Fig . (2).

Labour numbers vary according to the numbers of livestock which they take care of, but most of the examined farms, the labors do not exceed three workmen for each and most of them were illiterate fig. (3) and fig. (4). As illustrated in fig. (5), the majority of the livestock population in examined areas were ranging from 0-to 50 animals in each heard.

The distribution of cattle types was shown in fig. (6), the Friesian cross-bred was the predominant type in the study area, estimated (94%) of the samples.

Animals were classified into milking and dry cows, calves and bulls. Ratio of milking cows in Elsabil collection area were 39.84%, dry cows 35.65% calves 26.63%, bulls 2.20% from the total examined animals.

While the ratio of milking cows, dry cows, calves and bulls in Elshigla collection area were 42% , 31% , 25.88% and 2% respectively.

Milking cows represented 53% and 57% of the total cows; in Elsabil and Elshigla collections respectively.
Fig (1): Farms location

- Farms investigated in Khartoum: 40
- Farms investigated in Kh-North: 39
Fig (2): Farms Areas
Fig (3): number of labors
Fig (4): Labors education levels
Fig (5): Livestock population
Fig (6): Animal breeds in the examined farms
On the level of farms most of the owners have no planning or strict strategy to establish their own herd, consequently they depend on purchasing animals from other producers in order to breed them, this was expressed in fig. (7).

Fig. (8) Explained the types of animal feed in the examined area which consisted different supplies including concentrates in addition to crop residue, sorghum, wheat bran, green fodder and molasses.

The owners depend on a variety of food types either purchases from the market or produced and mixed in farm.

Fig. (9) focused on the feed cost which is considered as a big constraint on milk production, the majority of milk producers were complaining from the high prices of animal feed.

All animals in the examined farms were kept in open pens and the majority never graze out the pens in semi closed system, while open system means that some animals are grazing out the day, and brought back in the afternoon, Fig.(10). Fig.(11) showed the way of housing of animals inside the yard and pens, it explained that 61% of the owners in the investigated units keep their animals all together without separation, which should be done according to ages and productive status, while the rest (39%) separated their animals in groups. Fig (12) revealed the common diseases prevailed, the most important one was mastitis then CBPP. Other diseases such as Thieleriosis, Diarrhea, Worms, Fever, Ophthalmitis, Bloat, F.M.D, Retained placenta, Dystocia and Skin infection, are usually occur as sporadic cases among the examined herds. Fig(13) focused on the way of treatment and drug use, 40% of the owners treated their sick animals and use the drugs without any technical consultation, while 60% of the examined samples treated their animals according to technical consultation.

Fig.(14) indicates the incidence of mastitis in the sample which showed a high incidence (72%).
Fig (7): Farms animals sources
Concentrate Additives has Both Concentrate & Additives

Fig (8): Food type
Fig (9): Food Cost
Fig (10): Animal husbandry systems
Fig (11): Housing System
Fig (12): Common diseases in farms
Fig (13): Treatment and drug use
Fig (14): Mastitis incidence
Fig.(15) shows the percentage of the owners who consume milk of animals that on medication during withdrawal periods. Although the high incidence of mastitis in the samples, accordingly the culling is low to a certain extent; Fig.(16).

Fig. (17) shows the cost of mastitis treatment which was considered high according to the opinions of 56% of the examined samples. Usual culling program in the herds was shown in Fig.(18) while Fig(19) explained the usual causes of culling of animals in the herds.

The most important of the other causes was the financial need, e.g. some owners used to sale some animals to feed others. Records and recording system in the examined dairy herds was shown in Fig.(20) and fig.(21).

Although the recording system occur in 55% of the total, the available records and the system not based on a technical and scientific basis.

The daily average of milk yield was shown in Fig.(22) it revealed that in most of examined herds, average milk production on the range of 0-889 liter daily. Ways of milk distribution and marketing were shown in Fig.(23) which highlighted on the evident predominance of the mediators on milk marketing.

Fig. (24) explained the opinions of the producers on milk price, it was evident that most of them were not contented with this price. Table (1) revealed that the only type of insemination available for production was the natural service.

The majority of owners in the study samples do not care of specifying a particular place for parturition, table (2), also the most of them have no quarantine places for sick animals, table (3). Table (4) showed the poor link with the Veterinarians in the examined herds.

While table (5) expressed that the majority of the studied samples have a regular vaccination program. As shown in table (6) and table (7), the majority of owners do not care for the regular examination program neither to animals nor to the milk produced.

Table (8) showed the way of herd recording and like wise table (9) expressed the owners opinion in recording system. Some of owners think that the recording system is a boring and a tiring operation and as a result of this they usually write the information on papers which are lost at the end. Table (10) explained the daily expenses in the farm which were feeding of animals and manpower cost.
Fig (15): Dealing with milk during withdrawal Period
Fig (16): Culling due to Mastitis
Fig (17): Cost of Mastitis treatment
Fig (18): Culling program
Fig (19): Causes of culling of animals
Fig (20): Occurrence of recording system
Fig (21): Types of the existent records
Fig (22): Daily milk yield average

* Tumna : is a local milk can containing (8) milk pounds
Fig (23): Way of milk distribution
Fig (24): The current milk price
Table (1): The way of insemination

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
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<tr>
<td>Natural service</td>
<td>79</td>
<td>100%</td>
</tr>
<tr>
<td>Artificial (A.I)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100.00</td>
</tr>
</tbody>
</table>

N.B. Total number of examined farms = 79

Table (2): Presence of special places for parturition:

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of especial Places for parturition</td>
<td>8</td>
<td>10.13%</td>
</tr>
<tr>
<td>Absence of especial Places for parturition</td>
<td>71</td>
<td>89.87%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table (3): Presence of quarantine places for isolation sick animal

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of especial Places for quarantine</td>
<td>28</td>
<td>35.44%</td>
</tr>
<tr>
<td>Absence of especial Places for quarantine</td>
<td>51</td>
<td>64.56%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table (4): Veterinary supervision in the farm

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of vet. Supervision</td>
<td>14</td>
<td>17.72%</td>
</tr>
<tr>
<td>Unavailability of vet. supervision</td>
<td>65</td>
<td>82.28%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Table (5): Vaccination program in the farm

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular</td>
<td>75</td>
<td>94.94%</td>
</tr>
<tr>
<td>Irregular</td>
<td>4</td>
<td>5.06</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table (6): Periodic laboratory tests in the farm

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>15</td>
<td>18.99%</td>
</tr>
<tr>
<td>Not available</td>
<td>64</td>
<td>81.01%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table (7): Milk check-up test in the farm

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>3</td>
<td>3.80%</td>
</tr>
<tr>
<td>Not available</td>
<td>76</td>
<td>96.20%</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table (8): Method or the way of recording in the farm

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>44</td>
<td>100%</td>
</tr>
<tr>
<td>Computerized</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>* Total</td>
<td>44</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* N.B there were 35 farms have no records
Table (9): Owners opinion in recording system

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording is useful in</td>
<td>38</td>
<td>86.36%</td>
</tr>
<tr>
<td>Following up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recording take time</td>
<td>5</td>
<td>11.36%</td>
</tr>
<tr>
<td>Other (boring, tiring,.etc)</td>
<td>1</td>
<td>2.27%</td>
</tr>
<tr>
<td>Total</td>
<td>**44</td>
<td>100.00</td>
</tr>
</tbody>
</table>

** Only 44 farms have records

Table (10): The daily farm expenses

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding of animal</td>
<td>39</td>
<td>50%</td>
</tr>
<tr>
<td>Man power + animal feeding</td>
<td>39</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>*78</td>
<td>100%</td>
</tr>
</tbody>
</table>

*one farm has no answer.
Correlations among different production traits:–

In order to determine the relationships among some of the production traits, pearson coefficients were presented in tables (11), (12), (13) and (14).

As in table (11) there was a strong positive relation between areas and livestock population with a value of coefficient (.399). Also there was a positive relation between labors number and livestock population, the value of the coefficient was (.287).

The correlation between education and daily average of milk yield revealed that there was no clear relation in between, table (12). Correlation between breed and milk production was a little positive relation with a value of coefficient equal (.054), table (12).

Milk yield correlation with the cost of ration showed a weak negative relation with value of (-.095). Also correlation between milk yield and the type or source of food revealed a positive relation but not strong, its value of coefficient was (.182), table (12). Moreover, milk yield correlated with the common diseases showed a weak negative relation with value of (-.102) table (12).

Like wise, there was a negative relation between the housing system and milk yield, its value (-.271). Correlation between milk yield and incidence of mastitis showed a strong negative relation with coefficient value of (-.227). Table (12).

On the contrary, the correlation between the veterinary supervision and the way of treatment and drugs use as expected was a strong positive relation of coefficient (.370), table (13).

Daily farm expenses correlation with the cost of ration also showed a weak negative relation, its value (-.162), table (14).
Correlations Tables:

### Correlation Table (11)

<table>
<thead>
<tr>
<th></th>
<th>Livestock pop.</th>
<th>Area</th>
<th>Labour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock population</td>
<td>1</td>
<td>.399*</td>
<td>.287*</td>
</tr>
</tbody>
</table>

* the value of correlation coefficient (r) which is an absolute value between (-1 and +1), for a perfect +ve association (r)=(1), for a perfect –ve association (r)=-1, if no association (r)=0.

### Correlation Table (12)

<table>
<thead>
<tr>
<th></th>
<th>M .yield</th>
<th>Education</th>
<th>Breed</th>
<th>Cost of ration</th>
<th>Type of ration</th>
<th>Housing system</th>
<th>Mastitis incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily milk yield</td>
<td>1</td>
<td>.054</td>
<td>.096</td>
<td>.095</td>
<td>.182</td>
<td>-.271</td>
<td>-.227</td>
</tr>
</tbody>
</table>

### Correlation Table (13)

<table>
<thead>
<tr>
<th></th>
<th>Treatment and drug use</th>
<th>Vet. supervision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vet. Supervision</td>
<td>.370</td>
<td>1</td>
</tr>
</tbody>
</table>

### Correlation Table (14)

<table>
<thead>
<tr>
<th></th>
<th>Cost of relation</th>
<th>Daily expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily expenses</td>
<td>-.162</td>
<td>1</td>
</tr>
</tbody>
</table>
CHAPTER FOUR
DISCUSSION

This study was carried out in Khartoum and Khartoum north towns, in dairy cows kept in organized collections in the extremities.

Any one of the animal's owners had given an area of land according to his animals numbers. This land considered as a farm which termed (zeribas) in local language. These farms (zeribas) row beside each other to form what is called collections. The objective of the present work was to investigate the factors or production influences which have a great impacts on the optimum milk production and reproductive performance of dairy animals in Khartoum State.

Several factors were found to have an influence on the milk production included:

**Feeding system :-**

The study confirmed the importance of the source and type of ration to dairy animal, this finding in agreement with that of Abu essa, (2000), who reported that in the different lactation seasons, cows are vary in their nutritional needs according to every period of these seasons, so it is very essential to supply the cows with a good food source with a high nutritive value in order to encourage them to eat well and to compensate their body losses during lactation period.

Also the cost of the ration, which affect the total production cost, besides its effect on the maximum productivity. Moreover its effect on the other daily farm expenses. These results also agreed with that of Abu eisa, (2001) who noted that the nutritional cost forms more than 55% of the total vertical cost of the production and whenever the milk productivity from a cow was increased, the cost for production of one liter of milk would decrease accordingly. As well as he mentioned that the cattle need two types of ration; the first one is the maintenance ration which amount to 2.5 - 3% body weight (dry matter), this ration mostly consists of green fodder, crop residues and grasses. The second type of the ration is the productive one which must be provided to animal in order to achieve its productive capability. In addition to that, he added many factors which have a negative impact on milk production such as poor quality feed and neglect of records keeping.

Plus that, Abdullah, (2002), previously emphasized on the importance of the nutrition to the dairy animals, the thing that was confirmed by the present study. And also Elkhidir,
et.al (2005), talked about the poor nutritive value of the fodders which the owners used to mix together in unbalanced mixing such as Bagasse(sugar cane) and Tibin. Also he stated that owners used to feed all animals together without consideration to the productivity variation.

Health care and the veterinary services :-
The present study showed the negative effect of diseases on milk production, also the study indicated in particular the mastitis influence. These results agreed with previous observations and reports of other authors {Brumby, et al., (1986), Elbarbari, (2000), Fagiri, et al. (2000), Abu eisa, (2001); and Abdullah, (2002)}.

Brumby, et. al, (1986), mentioned health problems in details because they pointed to the disease as an important constraint on all forms of livestock production especially for calves. Elbarbari, (2000), reported diseases as one of the obstacles which form an impediment in the way of the accurate planning to economically breed milking cow, also restrict its growth rate, and reduce milk production in the Arabic area.

Fagiri, et.al (2000), talked about the health problems in dairy farms and its negative effect on milk production, they stressed on the necessity of application of regular examinations in these farms in order to protect both of the human and animal health. Also they said that vaccination, veterinary services and effective extension services should be available to minimize the negative effect of these health problems.

And Abu eisa, (2001), stated that diseases prevalence and bad health situation would reduce animal productivity. As well as Abdullah, (2002), mentioned that animal health consider as one of the important pillars that ensure the dairy farms success, and all the operations which concern animal production, and that because diseases and health problems have a direct danger to Man who deal with the animal or with its products, besides the negative effect of the diseases on the animal itself and its productive capability.

The study revealed that a considerable percentage of owners (40%) were adapted to use Vet. drugs without any technical consultation or experience, they tend to use what the others used. And this is a problem besides the poor link with the veterinarians and other specialists in animal production.

This result may be attributed to the limitation of Veterinary extension and the shortage of the Veterinary services, this finding agreed with that reported by other authors.
(Essawi, et al., 1996; Saeed et al. 2000 and Elkhidir et al. 2005). All those authors agreed that there is an absence of extension services and shortage of the veterinary services in the dairy farms, the thing that impede milk production in Sudan. And because of the traditionalism of the milk sector there is an urgent need to promote the veterinary services and transfer the technologies to the farmers and the producers through adopting an effective extension program.

Although the present study noted that there was a 94% of the study samples vaccinate their animals regularly, this finding seems to be less precise, because as observed by investigation, some owners do not care of vaccination unless the technical authorities come and persuade them, also some of them believe that the vaccination may causes some diseases to their animals (CBPP..etc).

The study indicated the poor health management in the study samples, there was no particular places for parturition nor quarantine places for isolation, in addition to the lack of regular and periodic laboratory examinations neither for animals nor for the milk produced.

The study revealed that the natural service is the only way for insemination in these herds, and this finding confirm the traditionalism of the reproduction system.

**Manpower and the Education :**

The present study detected that the influence of education level on milk production tend to be nil, this may probably due to prevalence of illiteracy among the most of this sector, also the traditionalism of animal production, in fact milk production in the Sudan is still depends on traditional methods of management, feeding and marketing, consequently there was no difference among animal owners between the illiterate and educated in concern of making fatal decisions and application of a new technical methods in animal health management, breeding, feeding, husbandry…etc.

As expected, the present study confirmed the relation between the numbers of animals and the areas of land which they occupied, in addition to manpower numbers. These results indicated the importance of provision of a suitable number of workers and adequate areas of suitable land according to the number of animals.

The importance of provision of a qualified manpower is due to the fact that the labour in dairy farms not only do the manual works, they even supervise and manage the whole production in the farm so they may probably share in making decision. These
findings are similar to the observation previously reported by (Abu eisa, 2002; Abdulllah, 2002 and Elkhidir et al., 2005).

As they reported, manpower is an effective factor on both of the production cost and the maximum productivity, they do most of the jobs in the farm, feed the animals, milk the cows, clean the pens and they often supervise and manage the farm, so they should be qualified and incentive particularly those supervise and make decision instead of the owners.

**Herd structure:**

The ratios of milking cows in both collections were not corresponding with the quantities of the milk produced. This may be attributed to the fact that some owners tend to keep a low producer cows and adult ones in the herds for a long time as assort of likeness. This actually reflects the big numbers of cows plus high cost of production accompanied with low production.

Furthermore it reflects poor management in terms of animal nutrition, herd management, health and fertility control.

This finding agreed with the observations previously reported by other authors (Essawi et al, 1996; and Elkhidir et al, 2005).

Essawi, et.al, (1996), talked about the imbalanced in dairy herds which entails negative effects on the performance of the dairy farms, and Elkhidir, et.al (2005), also stated that the owners do not separate the cows according to its productivity, and they also used to keep old cows within the herd.

**Housing:**

The present study detected that the system of housing had a versus relation with milk yield to a certain extent, this reflects the poor system of housing, owners tend to keep animals all together without separation, even those who separated their animals, do this in feeding times only, also some owners keep animals in open spaces without any shade.

These findings were similar to the observations that previously reported; Essawi et al, (1996), talked about the unsuitability of the pens area compared with the animal numbers, unavailability of clean water for drinking, lack of the shade in the most cases and keeping all animals together without any consideration to age, sex or productive stage.
Fagiri, et.al (2000), said that housing and management system in dairy farms differ according to the ability of each farmer, his awareness and the economical importance of his herd. They affirmed the importance of the management and housing system on the cow productivity, in addition to that, they divided milk farms to three levels according to the management system that the farmer followed.

Abdullah, (2002), mentioned the importance of the cows separation inside the herd to dry cows and milking one, in order to facilitate the supervision and the management.

Elkhidir, et.al (2005), pointed to the intensive number of cows inside the pen and the poor shade.

With regard to animals breeds, the study revealed lightly positive effect on the milk production, that is possible due to the predominance of one type of breeds on ratio more than 90% of the total examined sample, and according to this the daily milk yield of a cow in the study samples ranged from 12-50 pounds of milk according to breed and other effective factors as feed and health status.

This breed (Friesian cross-breed) were vary in its foreign blood ratio, and this actually stressed on the fact that there's an absence of any national breeding policy, that is to say cross-breeding is carried out traditionally without any technical systematic method.

This result was in agreement with that of Badi, (1988) who indicated that lack of the major impact on cross-breeding strategy and the absence of the national breeding policy.

**Farm management:**

Although there was a sort of recording system around 55% from the total samples, the existing records lack the accuracy and applicatory sence. In general the majority of owners in the study samples used to evaluated their business and they were willing to improve their work but actually their standards on making evaluation is based on their visible observation and the daily income without depending on accurate information or records, and this situation reveals the ignorance and misunderstanding of the essential role of keeping records which provide guidelines to evaluate and improve production and profit of the dairy herd.

In fact owners, depending on their observations and with that of their workers, make some changes and improvements in the farm, according to their financial ability in order to improve their daily income, and even these changes usually depend on what was
experienced by others. All these findings can be added to the previous observations of; Essawi, et.al (1996) and Elkhidir, et.al (2005) , they reported that there is an absence of records system as well as poor care and management in the dairy farms.
CONCLUSION AND RECOMMENDATIONS

In conclusion, the present study draw the attention to the importance of milk production sector as a vital investment in the field of animal production. This sector needs a lot of work in many trends such as genetic and environmental setup which have a great impact on dairy cattle. Cross-breeding is one of the methods of genetic improvement that needs a comprehensive strategy which in fact must be adopted by the technical authority, so it is officially recommended to establish breeding policies. Moreover, the authority must have an effective role in setting the legislations and laws which control milk production and marketing in order to protect both of the producers and the consumers.

There are many technologies associated with dairy development, include: A.I, pasteurization and packing of milk, cooling and marketing, using of milking machine and nutritional improvement which aids on provision of correct and balanced feeding with reduction of production cost.

These technologies and services should be available to transfer and applicable in field, and this will be attainable through an effective extension system which has a strong links with research centers and other concerned institutions. And in the matter of scientific research it should be planned and has strategy according to the practical needs, so it is recommended to do more studies and researches on this field to investigate the problems and constraints which limit animal production in the tropics, and to set the suitable scientific solutions.

In this concern it is also recommended to revise the activity of the animals farms which belong to government and the educational institutes to represent the centre of application of the results of scientific researches and experiments, in order to encourage and motivate animal production on base of technology. Veterinarians, consultants, nutritionists and decision makers should work together in coordination to provide information and valuable assistances. So the study recommend and emphasized the importance of coordinated effort in provision of extension services. Therefore, veterinary extension system should be supported and developed to play its role in improving milk production, and this in turn should be one of the priorities of the concerned authority.
The government will invest in extension when it believes it has value as a policy instrument which helps to achieve government goals.

Thus, the present study offers the following brief presentation as unprecedented contribution to explain some of the extension work aspects to be in use in development of milk sector in order to achieve the required food security.

**The Suggested Extension Work Aspects:**

**Definition of the Extension:**

Extension is a conscious use of communication of information to help people to form sound opinions and make sound decisions.

So extension is an educational activity intended to provide information, knowledges, help and advice, it also aids in provision of veterinary services.

Extension represents the linkage between the research centers and the field, by stimulating animal owners to use modern scientific production technologies developed by research.

**Role of Extension in development of milk production:**

The present situation of milk production needs more effort and extensive work through many different tools of extension. Firstly, planning a suitable extension program is recommended. This program must consider the goal, target group, the content of extension message and the method of extension. When we want to select the extension method, some important points to consider are:

- The goal, size and educational level of the target group, level of trust between target group and extensionist, skills of the extensionist, manpower and resources available. Generally, there are many methods and channels of extension to be contact with the target sector, they include:

  1. **Mass media** which play a greater role in the process of change, and it fulfils certain functions which involve:
      - transferring knowledge
      - forming and changing opinions.
      - Changing behaviour

Mass media available such as: newspapers, Magazines, Leaflets, radio and television. Some of mass media play a limited role because of illiteracy.
among the target group. Further more, the most effective manner of presentation depend on the tradition of the target group with oral literature. Most of animal owners and farmers do not read much, but they listen to story tellers, singers, religious plays…etc. extensionists should study these traditions in order to be able to adjust their messages and manner of presentation to the expectations and experiences of their target group.

**Radio** e.g. : is the most important mass medium for animal owners and the farmers as well , the program must be broadcast at times when the target groups and their families can listen, usually early in the morning or in the evenings after work. Program must based on local problems and by using easy and simple language which can be understood.

2. **Demonstrations and fairs** : they may stimulate farmers to try out innovations themselves. These tools of extension can show also, causes of problems and possible solutions without complicated technical details, especially where the demonstration is of results of certain actions, and if it is in similar conditions it will be a great deal . We can apply demonstration farms to persuade animal owners to accept some of modern techniques such as A.I…etc . A great advantage of demonstrations is to see how a new method works in practice, this will be of a great value especially in the milk production sector which is characterized by traditionalism.

3. **Group discussions** : as in workshop, seminar, training program. Group discussion increase knowledge of the target group, changing in their attitude and behavior.

4. **Speeches or talks** : consider public speaking, is an important means of transferring information .

5. **Mutual discussion** : it represents an individual extension, termed face to face extension method . Also through regular visits, dialogue and discussion , extension goals will be achieve.
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