

Biosecurity and Mobility Control in Dairy farms in Khartoum State

Shams Eldein H. Ahmed¹, Raga M. Elzaki², Osama E. Yassin³; Babiker AwadElseed⁴

1 Sudan University of Sciences and Technology, College of Veterinary Medicine, Biomedical Sciences, Sudan

2 University of Gezira, Faculty of Animal Production, Rural Economics and Development, Sudan

3 Sudan University of Sciences and Technology, College of Animal Production Technology and Sciences

4 Babiker AwadElseed - Animal Production Research Centre-Kuku

SUMMARY

A total of 60 dairy farms was randomly selected, 20 farms from Khartoum, Omdurman and Bahry Commissionaires respectively, during the period January July 2009 .A field survey was conducted through questionnaires, personnel interviews and observations on the impact of mobility on biosecurity in Khartoum State dairy farms. Educational level, human and animal movements formed the study substance. Collected data was tabulated and analyzed by simple percentages and frequencies. Education wise 50% of the total sample were secondary and above and 50% primary and below .Of the farms only 10% had a no entrance sign, 6.5 % used footbath, 10% special entrance coat and 12% coat plus shoes for visitors. For labors visits 26% visit no farms and 68% allow other's visits. For car movement 50% have special entrance, 28% share cars and only 3.2% disinfect cars. New purchased animals are isolated by 10% of the farmers, 40% share equipment and 36% dispose of dead animals by just removal. The study is recommended to increase the awareness on external and internal biosecurity measures through proper extension education and the entry doors should be secure and locked.

N.B. *Dairy farms, biosecurity, mobility control.*

Contact Address: Shams Eldein H. Ahmed1, Sudan University of Sciences and Technology, Bahri- Hilat Koko- College of Veterinary Medicine. Khartoum, Sudan, e-mail: shamshahmed@yahoo.com
Tel:0914887173

INTRODUCTION

Khartoum State maintains high population density estimated at 5.7 million, people increasing at a rate of 4.0% due to influx from other States.

Milk consumption in estimation at 465000 tons annually with 81.5%kg per capita consumption but the actual available amount is estimated at 362000 tons, deficit being supplemented by imported powdered milk (Tambal and Ali 2004). To meet this demand over 150000 diary caws are being raised in Khartoum State (K.S).

To maintain and raise the level of production and to keep high health state for these diary animals biosecurity protocols impose a need and special attention. Biosecurity in diary farms involves both external and internal measures to prevent disease spreading.

External biosecurity involves practices and techniques directed to prevent entry of new diseases into a group of animals. Internal biosecurity or biocontainment involves practices

and techniques directed to prevention or spreading of disease within the existing groups of animals. (Barrington *et al.*, 2005)

External biosecurity is particularly important when there is extensive movement of animals which in a feature of many of (K S) diary farms.

Internal biosecurity typically involves this prevention and treatment of failure of passive transfer, maintenance of proper nutrition and housing and implementation of appropriate vaccination program for endemic or relevant diseases. Also attention to appropriate cleaning and disinfection procedures related to housing feeding equipment treatment is important for the maintenance of both external and internal biosecurity practices (Dargatz, *et al.*, 2002).

The goal of biosecurity is to minimize the introduction of disease onto farms, limit the spread of diseases already on farms and reduce the risk of disease being carried between the farms.

Biosecurity management practices are designed to prevent the spread of disease by minimizing movement of biologic organisms and their vectors (Viruses, bacteria, rodents' flies' etc...) onto and within operations through animal, vehicles, visitor's personnel, pests and other means.(Thomson, 1999)..

While developing and maintaining biosecurity is difficult it still remains to be the cheapest, most effective means of disease control available and no disease prevention program will work without it.

Diary farms in general tend to be very open in terms of policies regarding site visitation and limitations there to.

Generally a biosecurity plan has three major components, namely, isolation, traffic, control and sanitation which when are effectively managed meet the principle biosecurity. (Thomson, 1999).

Key farms management practices are intended to prevent or reduce these three potential hazards to acceptable levels.

The objectives of this study are to assess the biosecurity situation in KS diary farms with respect to animal and human mobility and traffic and some related biosecurity management practice and to provide some biosecurity improvement suggestions.

RESEARCH METHODOLOGY

A total of sixty diary farms were randomly selected from seven localities of KS, 20 from each of Khartoum, Omdurman, and Bahry, (Khartoum north), Commissionaires respectively. A field survey was conducted using structured and non- structured questionnaire, personnel interviews and personal observations.

The data was recorded on the questionnaire papers and notes and photographs were also taken. Data was then tabulated for the educational level, human and animal movements in addition to some pertaining biosecurity parameters.

The data was analyzed using simple percentages and frequencies.

RESULTS AND DISSCUSSION

The educational level is a major and decisive, component for understanding the concepts. Importance and application of biosecurity measure in all farming operations diary farms being not an exception.

Table (1) shows the educational level of the farmer surveyed.

Table (1). Farmers educational level in the commissionaires of Khartoum State.

Level of Education	Khartoum localities		Bahry localities		Omdurman localities		Khartoum State	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Literate	2	10	1	5	6	30	9	15
Khalwa	2	10	0	0	1	5	3	5
Primary School	5	25	5	25	8	40	18	30
Secondary School	3	15	2	10	2	10	7	11.7
Higher Education	8	40	12	60	3	15	23	38.3

Source: field survey, 2009

The data on the table show that 38.3% of the total State samples were of higher level of education followed by 30% of primary school. On data summation 50% of the total sample was of secondary and higher education and 50% from primary school and below.

This low education group may lack knowledge and information on biosecurity concepts and application and as such present a major human hazard for biosecurity application on the farms.

The concept of biosecurity is not new and is and has been the subject of many scientific papers and lay- press articles devoted to various animal production systems but renewal and continuous awareness need to be accelerated and sustained for any developed diary production in the State.

Table (2) shows the important human movement and traffic on biosecurity of KS diary farms.

Table (2). Impact of human movement and traffic on biosecurity of KS diary farms.

Parameters	Khartoum localities		Bahry localities		Omdurman localities		Khartoum State	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Sign of no entrance	3	15	3	15	0	0	6	10
Footbath	2	10	2	10	0	0	4	6.7
Available coat at entrance	0	0	1	5	0	0	6	11.7
Coat and shoes for visitors	5	25	2	10	0	0	17	26.6
No Visit to other farm	9	45	7	35	0	0	16	26.6
Other farm labor visit	12	60	11	55	18	90	41	68.3

Share labors	2	10	1	5	1	5	4	6.7
Reception	17	85	11	55	20	100	48	80
Farm keepers	19	95	16	80	20	100	55	91.7
Barrier	16	80	19	95	20	100	55	91.7
Car entrance farm	10	50	13	65	7	35	30	50
Cars disinfection	2	10	0	0	0	0	2	3.3
Share cars	8	61	5	29.4	4	50	17	28.3

Source: Field survey, 2009.

The data on the table shows that only 10% of the farm owners put a sign of ‘‘No entrance’’ at the gates and 6.5% only use gate footbath, 10% only provide special coats at the entrance and 12% of the farmers provide special coats and shoes at the gate.

For labors movement control only 26% of the farmers prohibit visits to other farms while 68% of the total sample studied allows other farm laborers visitors.

As for automobile traffic 50% of the farmers in the sample studied do not have special car entrance 28% of them share cars and only 3.2% use car disinfection practice .

Change of dress is important as research results have shown that a change of outer garments and washing hands and arms is adequate to prevent transmission of a variety of pathogens (Carlton, 2004).

At a biosecurity work shop at the University of Minnesota Ieman (2003) stated that it was decided that most common-sense downtime between commercial production systems should be over night as an over night downtime should ensure a shower and a change of clothes.

Winston (2004) stated that when addressing the issue of biosecurity at a dairy operation it becomes important that producer regulating how and where visitors are allowed should be implemented before an emergency occurs aiming at minimizing the possibility of disease causing substances being trashed in on foot wear, clothing or even hairs .

These may include walking through a disinfecting footpath or showering and then changing in to disposable clothing and footwear before entering livestock areas.

When leaving the premises the disposable clothing is left behind and the footwear is disinfected again.

An important observation in the emergence of many dairy farms in the last 10 years in KS is that many farms in close proximity to one another which might potentiate and provoke many negative biosecurity problems and hazards.

Here, again, on daily bases many people influx and movement between and within farms are noticed, these include milk trucks, feed delivery cars, services personnel, route delivery customer, wholesales men and other introducers.

As such, on daily bases a dairy farms is visited by a variety of a number of people who may have been probably on other farms on the same day.

This is, in addition, to exchange of visits by the farm labor as stated before (tables 2).

By personal observation during the study it was noticed that personnel attending sick or quarantined animals move freely in the farm operations and do not use any protective clothing such as overalls, cuffs, boots or shoes, cover , gloves etc neither that they take any protective biosecurity measures or limit themselves solely to the sick or quarantined animals .

Traffic control:-

As shown in table (2) a total of 50% of the farmers do not have a special car entrance, 28% share cars and only 3.2% use car disinfection. All are biosecurity short comings. Traffic is more than cars and vehicles. It includes visitors, all animals including dogs, cats, enquires, wild live, rodents, birds and humans.

People spread contaminated material directly by boots, shoes, hands and clothes and indirectly by shared hoof trimmers, truck tires, farm machinery and any other equipment passing between farms (Marilyn, *et al.*, 2009).

Traffic control within the operation should be designed to stop or minimize contamination of cattle, feed, feed handling equipment and equipment used on cattle.

Traffic control includes traffic onto the operation and traffic pattern within the operation.

Study observation showed that traffic control in most of the farms surveyed was at minimum and received little or no attention either onto or from the owner farm for the above mentioned parameters.

Animal movement:-

Table (3) shows the pattern of animal movement in the study sample. The table shows that 60% of the State farmers isolate new added cows in special place, 60% isolate for a month and 21% for less than a month from this sample.

Thirty six percent of the total samples do not isolate new comers which may be a potential biosecurity hazard for these farm units and other neighboring.

Importantly as stated by Barington (2002) transfer of certain disease agents does not necessarily require direct contract between animals. Some pathogens are efficiently transmitted in the air or water, some can survive in soil or organic debris for extended periods (weeks to month) and some are transmitted via vomits (equipment, tack etc) pests (flies, rodents etc) or by visitors and personnel.

In additional to the 36% who do not isolate new coming animals, the table shows that 40% of the farmers share drinkers and feeders and both comprise a risk potential for disease transmission through vomiting as mentioned above.

Introduction of infected animals or replacement stock are some of the great risks of introducing pathogens to the herd. The need for quarantine of such animals in abiosecured isolation facility prior to entry in to the existing herd cannot be overlooked and is widely recognized.

Table (3). Animal Movement Control in different localities of Khartoum State.

Parameters	Khartoum localities		Bahry localities		Omdurman localities		Khartoum State	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
New cows isolation in special place	14	70	12	60	10	50	36	60
New cows isolation for a month	7	35	2	10	4	20	36	60
New cows isolation less than a month	7	35	9	47.4	6	30	13	21.7
No isolation	6	30	8	42.1	10	50	22	36.7

Drinkers and feeders share	0	0	2	10	0	0	24	40
Sick cows isolation	18	90	14	70	14	70	2	3.3
Dead cows elimination burning	11	55	13	65	13	65	46	76.7
Dead cows elimination remove	8	40	7	35	7	35.0	22	36.7
Manure elimination	20	100	20	100	20	100	60	100

Source: Field survey, 2009.

The concept of new animal isolation should also include reintroduction of animals which have been temporarily kept at other facilities or were outside grazing outside the farmstead as happens in many dairy farms in KS:

There are three common methods of dead animal removal namely composition, incineration and rendering (Carlton 2004).

Here the study showed that 36% of the farm owners resort to animal removal outside the operation unit and many just throw dead animals in the open which then creates an important biosecurity hazard.

Biosecurity elements include biological, chemical and physical hazards. Biological hazards include risks from viruses, bacteria parasites and other contaminants. Control must be considered from the stand point of introduction to the farm, exposure and spread within the herd, general and specific measures for immunization and minimizing risk of export to other farms.

For chemical hazards there should be a plan for handling and storage of pesticides, herbicides, feed additives, drugs medicines and any potentially toxic materials.

Physical hazards need a plan for animal handling and treatment to minimize trauma and maximize comfort and care, this includes ventilation, traffic flow, housing facilities and animal handling equipments. (Anderson, 1998).

Suggested Recommendations:-

- Increasing awareness on external and internal biosecurity measures through proper extension education.
- Lessening introduction of new diseases by new coming animals. It is important that buyers are knowledgeable as on pertaining to animal history, health status, biosecurity protocols etc-. This might be authenticated by relevant authorities.
- Need to develop management practices to reduce biological, physical and chemical risk again through proper extension work.
- Entry doors should be secure and locked.
- Protective equipment should be available, in place and functioning. .
- Practice isolation and quarantine procedure for sick and newly imported animals. Also attention should be paid to proper dead animal disposal.
- Above all it becomes a must to limit and control human and animal movements from and within the farm unit.
- Regulations that have the power of law need to be developed to guarantee at least minimum well spelt biosecurity measures for both producing animals and related animal products.

REFERENCES

- Anderson, J.F (1998).** Biosecurity, a new term for an old concept, how to apply it, *Bovine Pract.* 32 (1998), pp. 61-70.
- Barrington , G.M. ,. Allen, A.J. Parish ,S.M and Tibary A. (2005)** Biosecurity and biocontainment in alpaca operations small ruminant 2005. v 07.pp 011.
- Barrington, G.M. Gay J.M. and Everman J.F. (2002).** Biosecurity for neonatal gastrointestinal diseases, *Vet. Clin. North Am, Food Anim. Pract.* 18 (2002), pp. 7-34. Abstract | View Record in Scopus | Cited By in Scopus (12)
- Carton, S,(2004).** An Introduction to Infectious Disease Control on Farms (Biosecurity). 2004. Bovine Alliance on Management & Nutrition Publication. Arlington, Virginia.
- Dargatz et al., 2002 D.A. Dargatz, F.B. Garry and J.L. Traub-Dargatz, (2002).** An introduction to biosecurity of cattle operations, *Vet. Clin. North Am., Food Anim. Pract.* 18 (2002), pp. 1-5. Abstract | View Record in Scopus | Cited By in Scopus (9)
- Marilyan,B, Grant, D, Dee,G ,(2009).** Biosecurity basis for cattle operation and good management practice for controlling infectious diseases (2009) Buplication *Biosecurity* 13,v 9, p1430
- Tambal, A.M. Ali, (2004).** Aspects of milk production in Sudan and suggestions for improvement, a paper presented (in Arabic) in a workshop on the role of vets. Expertise in the transfer of technology for development Khartoum, Sudan.,
- Thomson, J.U. (1999).** Biosecurity: Preventing and controlling diseases in the beef herd, *Proceedings of the Annual Meeting of the Livestock Conservation Institute Nashville, TN* (1999), pp. 49-51.
- Thomson, J.U.(1999).** Biosecurity: preventing and controlling diseases in the beef herd, *Proceedings of the Annual Meeting of the Livestock Conservation Institute Nashville, TN* (1999), pp. 49-51.

Authors:

د. شمس الدين حسب الله احمد- جامعة السودان للعلوم والتكنولوجيا- كلية الطب البيطري
د. رجاء محمد الزاكي -جامعة الجزيرة -كلية الإنتاج الحيواني

د. أسامة الشيخ يس- جامعة السودان للعلوم والتكنولوجيا- كلية علوم وتكنولوجيا الإنتاج الحيواني . د. بابكر عوض السيد- مركز بحوث الإنتاج الحيواني.

أجريت هذه الدراسة في مزارع إنتاج الألبان بولاية الخرطوم في الفترة بين 20 يناير إلى 20 يوليو 2009 لدراسة تطبيقات بعض اشتراطات الأمن الحيوي بالتركيز على الحركة. حيث تم توزيع 60 استبياناً على عدد من مزارع إنتاج الألبان بولاية الخرطوم بواقع 20 مزرعة لمنطقة الخرطوم ، منطقة بحري ومنطقة امدرمان وقد تم تحديد المزارع عشوائياً. تم جمع المعلومات والبيانات عن طريق الاستبيانات والمسح الميداني والملاحظة، ومن ثم تم عرض وتحليل النتائج ومناقشتها.

أوضحت الدراسة أن 50% هي نسبة التعليم العام وسط المزارعين ومثلها للتعليم العالي. ومن خلال الدراسة اتضح أن 10% فقط من المزارع بها يافطات توضح ممنوع الدخول وان 10% يضعون ملابس للزوار في باب المزرعة وكذلك فقط 6.7% من المزارع لها حوض تطهير عند مدخل المزرعة ونسبة 26.6% من المزارع تمنع عمالها من زيارة المزارع الأخرى واتضح كذلك أن 68% من المزارع يزور عمالها المزارع الأخرى وان 80% من المزارع بها استقبال وان نسبة بسيطة من المزارع (3.3%) تمارس نظام تطهير العربات الداخلة إلى المزرعة وان 28.3% تشترك في نفس العربات الداخلة إلى المزارع الأخرى 0 وكذلك أوضحت الدراسة إن نسبة 10% فقط تمارس عزل الأبقار المشتراه حديثاً في حظيرة منفصلة، وان 40% من المزارع تتبادل المعدات والأدوات وكذلك وجد أن التخلص من الأبقار النافقة يتم عن طريق الأباد فقط في 36% من المزارع ولكن من خلال الدراسة اتضح التباين الواضح في تطبيق اشتراطات الأمن الحيوي في مزارع إنتاج الألبان في ولاية الخرطوم.