Study of Risk Factors in Cattle Breeding to
Improve Milk Production in the Area of Batna

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Abstract: Risk factors constitute major obstacle for the development of dairy production. The objective of this study was to determine some of these risk factors at the level of 7 municipalities in the wilaya of Batna in order to adopt a plan for the management and control of these factors. Since it is not possible to completely eradicate them, efforts should be made to minimize their effects within dairy farms with the aim of improving dairy production in the region. From 172 dairy cattle farms, containing 2262 head of cattle, 1618 dairy cows were only included with an average of 9 cows per farm. The racial composition of the stations surveyed revealed a clear dominance of modern races 95.00% of the total breeds were improved breeds. They composed mainly of Black Pie (58.00%), Red Pie (20.80%), Holstein (11.40%) and Montbeliarde (6.30%), followed by Brown Atlas (1.20%) and the Brown of the Alps (2.50%). The main risk factors atord studied in addition to breed during our investigation concern the structure of the farm, cattles, hygien and control, food, diseases , premises and equipment, protection of livestock, production, storage and conditions transport of milk.The results showed that the risk of introduction of pathogens by other species and the risk of introducing pathogens by vehicles and visitors are very significant respectly at level 53.50% and 75.60%.Barley is widely feeding used by the dairy cows in farms 88.40%.Mastitis ranked first risk factor as a disease affects milk production with 43.80%. The three most important sources of the risk with a large average are: stables capacity 23.33 dairy production 18.83 and area 23.14.Our results have shown that there are three types of breeding: traditional small scale with poor livestock management, intermediate farms and modern well-structured farms. The general level of control of health risks is relatively low 48.40%.

Key words: Risk Factors · Batna · Cattle Farming · Milk Production

INTRODUCTION

Despite the ambitious efforts made by the authorities to solve the dairy problems in Algeria, dairy cattle-breeding stations still rely on a large deficit in milk leading to insufficient milk production [1], pushing the state to pour out huge sums of money to fill this gap. Algeria is the second largest world's importer of powdered milk and 23% of cheese and can provide only 4.5% of milk powder [2].

In 2014, the overall invoice experienced a historic surge with a level with a value of 1.9 billion dollars [3].

According to the sources of MADR [4], the constraints of the organization of the Algerian market (Weak collection structures, livestock management, lack of good or suitable quality of food for the feeding the livestock, poor milk yield etc ...) results in low milk production. Milk itself is one of the risk factors that can hinder dairy production because milk as staple daily diet [5, 6], allow the growth of several zoonotic pathogenic microorganisms and may be the source of several diseases and intoxications [7]. Milk is considered as a nearly complete food since it is a good source of protein [8]. It is universally recognized as a complete diet due to its essential components [9, 10].

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With per capita average consumption estimated at 120 liters of milk per year, Algerian remain the highest consumer of milk and dairy products in the North African, GAIN Report [11], the Wilaya of Batna is among the most productive Wilaya of milk with a production of more than 76.907 Million liters in 2014. In dairy cattle breeding, risk factors constitute a brake on the development of dairy production. Few studies have focused on the assessment of risk factors in Algeria. The purpose of this work is to characterize the behavior of breeding at the level of dairy cattle farms and to make an evaluation of the risk factors within these stations located in the North West belonging to 7 municipalities of the Wilaya. Our work therefore proposes a contribution to the study of risk factors in dairy cattle farms.

MATERIALS AND METHODS

Presentation of Study Area: The Wilaya of Batna has considerable agricultural potential, both natural and structural. It has a total agricultural area (SAT) of 1. 221883 hectares and a useful agricultural area (SAU) of 422 677 hectares of which 42.000 hectares are irrigated. Sheep occupy the first place with a head count of 1.359270 heads followed by cattle 86.137 heads, including 45.900 dairy [12] cows. The climate of Batna is of the semi-arid Mediterranean type [13] characterized by a severe cold winter and a hot, dry summer. Sometimes snowy during winter. The average annual rainfall is 329 mm / year. Environmental temperature ranges from 6.8°C in winter to 32.05 C in summer.

Methodology:
Before Presenting the Working Methodology We Will Give Some Definitions:

- Risk factor: All factors associated with an increase in the likelihood of occurrence or development of a pathological phenomenon constitutes risk factors [14].
- The Risk is the possibility of a potential damage to take place or that something bad happened [15].
- The Hazard: the intrinsic property of a hazardous substance or a physical condition that could cause harm to health and / or the environment [16].

The study was conducted from December to July. It is based on a survey of 172 dairy farms located in the North east of the Wilaya of Batna and considered as the main dairy catchment areas (Table 1).

The data collected and analyzed are based on surveys of 172 farms and were carried out in 7 communes of the Wilaya: Fesdis, Djerma, Ain yagout, Seriana, Lazrou, Oued El ma and Belezma. A survey was prepared on the structure of the farms and the management of 1618 dairy cows.

The selection criteria were based on a minimum of 5 dairy cows per farm and the acceptability of the farmer to participate in this study.

The selected stations belonging to the main dairy basins and are located in the North West of the Wilaya.

The methodology is based on a large number of surveys carried out among.

Registered dairy farmers and listed at the level of the Wilaya Chamber of Agriculture.

The main stages are preliminary surveys throughout the region and in-depth surveys of the 172 farms in the region's main dairy basins.

For each municipality we have chosen the breeding stations, each having at least 5 dairy cows and possibly having the same breeding characteristics:

- Study of the breeding station.
- Analysis of the breeding station based on the number of cattle and milk orientation.
- Feeding and assessing potential risks to the development of dairy production in the region.

A survey was carried out among 172 farms using a survey containing a hundred variables from which the most significant were selected.

Statistical Analysis: A descriptive analysis was performed for the evaluation of Proportions, Average, Min, Max, Sum, Standard deviations and Coefficient of variation of the various parameters chosen. Our study was carried out from December to July 2010. The farms are *Melk nature 57.00% and **Arch type 43.00%, with an area between 1 hectare and 60 hectares with an average of 23.14 hectares and whose operating system for the most part is intensive mod 89.00%. The size of the farms in the study area is an average of 09 cows. It is higher than that recorded at the national level 2 cows / livestock [17]. According to Sraïri [18] in Morocco, the livestock is 80.00% owned by small farms with fewer than 5 dairy cows. The livestock data register is present in 61.66% of cases. The breeding is carried out in an impregnated stall for 77.90% and free with 27.00%, the watering is traditional (Basin) to 81.40% and a mechanical milking to 64.40%. Reproduction is ensured by the natural mound to 57.50%

and artificial insemination is 42.50%. The diet consists mainly of grazing grass, bran 19.20%, alfalfa 17.40%, maize 14.70%, sorghum, straw and barley 88. 40%. Each station has a barn. The main risk factors that we have identified during our investigation concern premises and equipment, the livestock register, the protection of livestock, the health management of cattle, the production and storage of milk, the conditions transport of milk and finally food and diseases.

The results were performed using the Sphinx V5 and Microsoft Excel2007 software.
For each farm, 10 variables were selected.
* Melk land: lands of private status governed by Muslim law.
**Arch land: tribal lands, community enjoyment.

RESULTS AND DISCUSSION

The study was conducted from December to July. It is based on a survey of 172 dairy farms located in the North east of the Wilaya of Batna and considered as the main dairy catchment areas (Table 1).

The Figure 1 shows the distribution of dairy farms surveyed on the map of the Wilaya of Batna. We notice that the dairy farms studied were located in the North West of the Wilaya

The parameters that characterize the survey are illustrated in Table 2: the main variables of the survey (Average, Standard deviation, Min, Max, Sum and coefficient of variation). Figure (2) present the averages and standards deviation of 10 variables selected on the survey. All farms exploit average herd of 9.21. The dairy farm studied have a useful agricultural area of 23.14 hectares (ha) on average of which 33.10% of farms have less than 5 hectares with a staff that is from 1 to 15 breeders. The average dairy production is 18.87 with standard deviation of 3.12. The number of stables per farm varies from 1 to 4 with an average of 1.15 and standard deviation of 0.46.

The number of risks by year on the farm is significant from 1 to 3.

The risk of introduction of pathogens by other species neighboring is significant at 53.50%.

The risk of introducing pathogens by vehicles and visitors are very significant 75.60%.

We also noted that in Table 3, the risk assessment for introduction of pathogens by neighboring species is "satisfactory" for half of the farms 53.50%. This was referred to the fact that farmers have introduced provisions and measures to separate various animal species such as sheep, goats, dogs and poultry, sources of contamination of cattle.

We note that average risk factors with the standard deviation bars are significantly high for the following variables: Stables capacity(23, 33-21, 49), Area(23, 14-22, 74) and Dairy production(18, 87-3, 12).

The Table 4 illustrates the risk factors associated with the diseases encountered in decreasing order:

- Mastitis
- Locomotor problems: limping, walking and panaris
- Respiratory diseases
- Bovine babesiosis: theileriosis
- Meteorization

Mastitis ranked first risk factor as a disease affects milk production with 43.80%, moreover it is estimated that in Tunisia 30% of dairy cows are reformatted because of mastitis [19], followed by locomotors problems 24.40% and respiratory diseases 14.60% which is consistent with results obtained with several researchers [20, 21] this is due to temperature changes in semi-arid regions, especially cooling, which causes such respiratory disorders in cattle. However respiratory disorders listed as a second disease with 14.00% [21]. Parasitism and meteorization followed with rates of 11.20% and 0.50% respectively.

In Medea (North Algeria) [22] the most frequent diseases in the surveyed farms were mainly lameness (one of greatest constraints to productivity of dairy cattle [23]) with nearly 78.50% of cases, mastitis with 43.80%, respiratory and digestive diseases 35.70%, locomotor disorders come in second place with a rate 25.80%.

Some cows practice razing by going outside in the fields but results of our survey revealed on return the majority of these animals are maintained in old buildings generally constructed of cement often unhealthy without straw or litter. They are tired up and hindered in cramped barns so that they can not get up or lie down. This issue of comfort and well-being is associated with a better milk yield; however, almost all cowherds do not take this measure [24]. We can note that this uncomfortable position generates locomotor problems such as lameness which reduce milk production[25] and accentuates the nervousness of the cows in these poorly ventilated stables and without exercise area.

Table 1: Data on dairy farms surveyed

Municipalities	Number of farms	Frequency %	Number of cows	Dairy production kg (day)	Dairy production/ lactation) kg	Area (ha)
Fesdis	20	11.60	178	374	114 070	176
Djerma	32	18.60	400	613	186 965	230
Ain-yagout	26	15.10	340	512	156 160	420
Seriana	30	17.40	253	573	174 765	265
Lazrou	20	11.60	170	398	121 390	344
Oued el-ma	19	11.10	127	327	99 735	346
Belezma	25	14.50	169	438	133 590	426
Total	172	100	1618	3245	886 940	180

Table 2: The main variables selected of the survey

Variables	Average	Standard deviation	Min	Max	Sum	Coefficient of variation
Staff	2.90	1.98	1	15	499	0.68
Dairy cattle	9.41	6.89	5	49	1618	0.32
Dairy production	18.87	3.12	8	25	3245	0.16
Area	23.14	22.74	1	60	3806	0.98
Stables	1.15	0.46	1	4	198	0.40
Stables capacity	23.33	21.49	5	150	3989	0.92
Number of sick Animals	1.64	1.12	1	5	120	0.68
Number risk by year	1.25	0.54	1	3	208	0.43
Risk neighboring species	1.57	0.68	1.00	3.00	270	0.43
Risk for vehicles et visitors	1.31	0.60	1.00	3.00	226	0.45

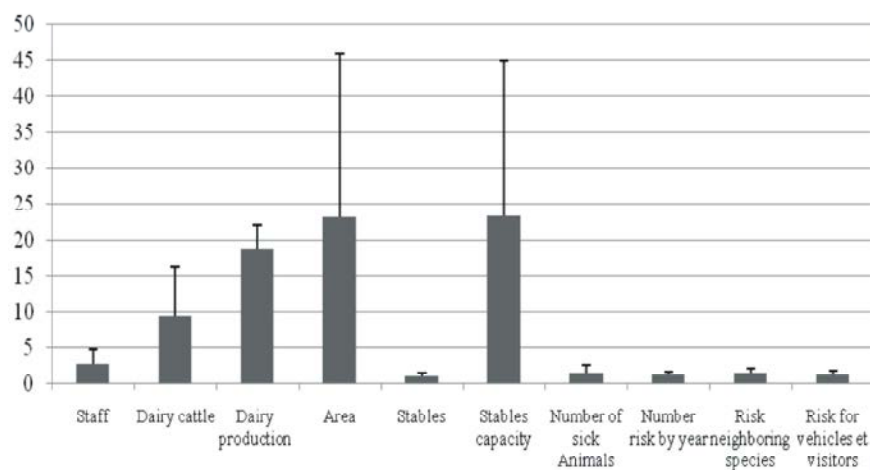Fig. 1: Distribution of dairy farms surveyed on the map of the Wilaya of Batna

Fig. 2: The average risk factors with standard deviation bars

Table 3: Risk assessment at the level of livestock

	Percentage rating 100%		
Risk assement	Satisfying	To improve	No satisfying
Risk of introduction of pathogens by neighboring species	53.50	36.10	10.50
Risk of introduction of pathogens by vehicles and visitors	75.60	17.40	7.00

Table 4: Disease Risk Factors

Values	Number cited	Fréquency
Mastitis	74	43.80 %
Locomotors problems	42	24.40 %
Respiratory diseases	25	14.60 %
Bovines babesiosis	20	11.60 %
Meteorization	11	6.40 %
Total	172	100 %

Table 5: Evaluation of the 6 survey headings and the general level control of health risks

	Percentage rating 100 %		
Sections	Satisfying	To improve	Non satisfying
Livestock register	60, 20	35, 50	4, 30
Livestock Protection	54.28	35.60	10.12
Premises and Equipment	42.40	51.60	6.00
Animal health management	56.60	19.72	23.68
Milking and storage of milk	60.80	22.10	14.10
Transport conditions of milk	82.00	6.40	11.60
General level of control of health risks	48.40	30.90	18.70

The General level of control of health risks is below average with a level of 48.40% From Table 5. The general level of control of health risks and the risk factors which can be summarized in 6 risk categories: livestock register, livestock protection, premises and equipment, animal health management, milking and storage of milk and transport conditions of milk.

The transport conditions are assessed as satisfactory in 82.00% of the farms.

This was due to the fact that most breeders have their milk transported in refrigerated tanks. 35.60%of dairy farms must improve their protection. On the other hand, 60.20% breeders have a register containing all the data concerning their livestock unit.

Milking and storage conditions remain satisfactory at 60.80%. This may be explained by the fact that most farmers use the milking machine and that they have cooling for the storage of milk.
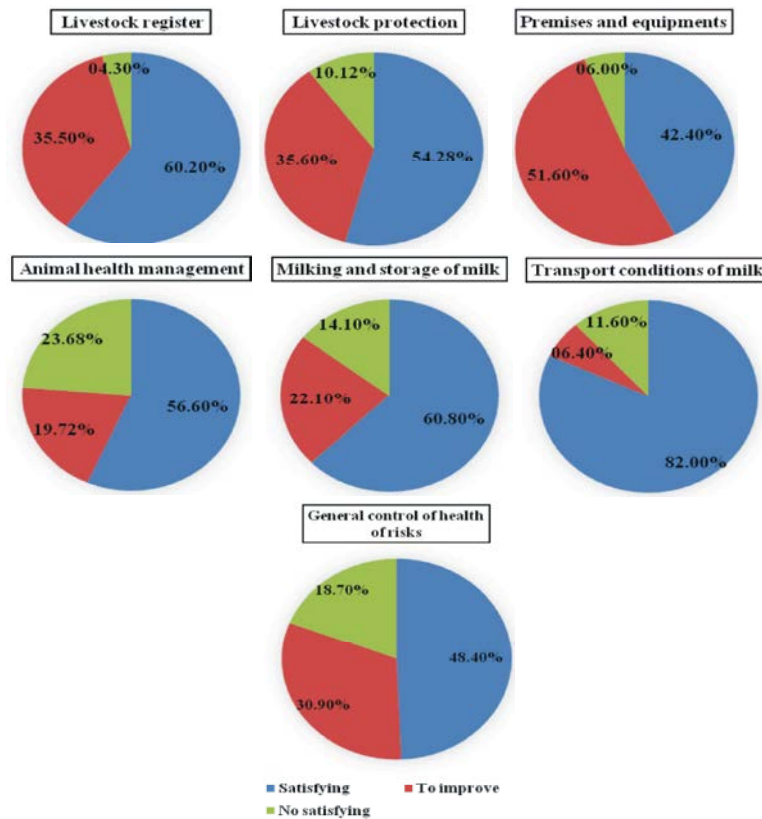
Fig. 3: Evaluation of the 6 sections of the survey and the general risk control

It could be notice that certain categories are more to be" improved" than others. This is in case in particular for the protection of livestock, premises and equipment and the milking and storage of milk.

As we have already said, more than half of the buildings of these breeding stations are former colonial farms built of stone, unhealthy, neither straw nor litter. The level of general risk control is still relatively low (48.40%) than who find [26] in his research 56.40%, which can be explained by the insufficient number of modern farms. Other results have shown that there are three types of breeding: traditional small-scale breeding with poor livestock management due probably to a lack of means, intermediate farms and modern well-structure farms with good livestock management. On the other hand, 86.00% of the farmers declared the presence of ticks but only 47.70% use deworming.

CONCLUSION

At the end of our study undertaken on the evaluation of the risk factors in dairy cattle breeding in the region of Batna, we can make the following observation:

- the dairy potential in many dairy farms exists but that these stations are subjected to constraints of risk factors that hinder the improvement of milk production.
- The various risk factors we have identified during our work constitute a major obstacle to the production of milk.

This study of risk factors would be a prerequisite for developing a plan to control these factors and, on the other hand, to improve the dairy production of farms. This implementation of this plan for the management and control of risk factors at the national level must be created in order to be able to limit risk factors as much as possible because they can not completely eradicate them.

A good knowledge of these risk factors can help each farmer assess his level of risk and take appropriate measures to protect him. This will help to support livestock farmers in their practices for controlling the health quality of their production and will make it possible to problems before they create a hazard to the consumer. It is therefore important to identify these risk factors.

The control of risk factors in bovine breeding may be involved in the detection of diseases such as tuberculosis and brucellosis.

It would be interesting to increase the number of the dairy farms in the sample in order to produce more representative results.

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