

The preliminary data on the biosecurity level of dairy cattle in Albania using the Biocheck.UGent scoring system

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Abstract – Farm biosecurity is the application of a set of procedures to prevent the entrance of illness into the farm and its subsequent spread among farm workers in the event of an outbreak. This study used the Biocheck.UGent scoring system to evaluate the biosecurity levels of thirty dairy farms. Following each submission of the hardcopy data uploaded to the internet software, reports were automatically generated. The demographic information was looked into in addition to the internal and external biosecurity indicators being statistically analysed. The information demonstrates how widely different farms' sizes and biosecurity ratings are from one another. Dairy farms received an overall biosecurity score of 50%, with average scores of 63% for external biosecurity and 37% for internal biosecurity. The biosecurity scores were compared to the global average. The usefulness of both internal and exterior biosecurity indicators was evaluated in relation to dairy cattle in Albania. The importance of addressing biosecurity concerns and their effects on animal health is the focus of this study. To gain a better understanding of the role biosecurity plays in the introduction and spread of diseases into dairy farms, more research on the biosecurity measures employed on these farms is required.

Keywords – Biocheck.Ugent Scoring System, Disease Control, Dairy Farm Biosecurity, Internal And External Biosecurity, Albania.

I. INTRODUCTION

Implementing a set of protocols to stop disease introduction into the farm and its subsequent spread among farm workers in the event of an outbreak is known as farm biosecurity. The 'One Health, One Welfare' approach prioritizes preventing disease for flock and herd animals, maintaining that prophylaxis is preferable to curative care [3].

Assessing a biosecurity program presents challenges. In the last decades, the Biocheck.UGent™ program has been started and today it is quite usable, which enables the conversion of field findings into a scoring system. The tools used for biosafety assessment have mainly been developed as checklists or manuals. As they are qualitative methods, they only indicate whether a specific biosecurity measure has been compiled or not: or whether it is present or not. The Biocheck.UGent™ scoring system is a risk-based scoring system that is reliable, reproducible and can be validated [3].

To quantify the degree of on-farm biosecurity, the Biocheck.UGent™ score system is utilized [3]. A farm's level of biosecurity is assessed by asking the farmer about their biosecurity procedures and gathering information through visual inspection. There are 124 dichotomous or trichotomies' questions in the dairy cattle questionnaire. External and internal biosecurity are the two primary subcategories of biosecurity.

Five subcategories make up the external biosecurity category: "the purchase and reproduction," "transport and disposal of carcasses," "food and water," "visitors and workers," and "parasite and other animal control." The six subcategories of internal biosecurity are "work organization and equipment," "health management," "calving management," "calf management," "milk management," "reared cattle management," and "health management" [3].

To present an objective, comprehensive, and quantitative description of the level of biosecurity, biosecurity questions are converted into points [3]. Moreover, because not all disease transmission routes are equally effective or frequent, the findings of each question are weighted, meaning that the result is multiplied by the weight factor. For all internal and external systems, the final biosecurity score ranges from 0 to 100. Subcategory points are obtained by multiplying the subcategory weight by the subcategory's proportional score.

Transboundary animal diseases and various outbreaks of infectious endemic diseases have been documented in the region and Albania within the previous ten years. The primary problem was determined to be the lack of farm biosecurity programs and their improper implementation. Using the Biocheck.UGent score system, the biosecurity levels of twenty-four dairy farms were evaluated in this study. Following each submission of the hardcopy data uploaded to the internet software, reports were automatically generated. The demographic data has been assessed in addition to statistical analyses of the internal and external biosecurity indicators.

II. MATERIALS AND METHOD

The Biocheck.UGent template translated into Albanian was completed in all 24 herds included in the study between September 2023 and May 2024. The implementation of biosecurity measures in these herds was assessed using the biosecurity assessment tool Biocheck.UGent (https://biocheckgent.com/sites/default/files/2020-02/Dairy_EN.pdf). The interviewer was trained to administer the questionnaire through a web-based course and specific instructions from the study team leader. For convenience the questionnaire was printed. Before completing the questionnaire, a tour of the farm was conducted. The farmer was always the interviewee. During the interview, notes were taken to mark the questions that caused difficulty in answering by the respondent. The data were transferred to the online questionnaire and the Biocheck.UGent™ system which calculated the points for the respective categories and subcategories. Weighted question scores were converted to scores between 0 and 100 for internal and external biosecurity. The value of weighted points equal to 0 (zero) corresponded to total lack of biosecurity and 100 with & perfect biosecurity. Finally, the results averages for external and internal biosecurity were calculated as the result of the whole herd. The distribution of responses was analysed using descriptive statistics. Based on the descriptive statistical analysis (Excel Tool Data Analyses, 2021) the mean, standard deviation, coefficient of variation and confidence interval were calculated for the subcategory scores (A-K) as seen in Table 1. The obtained results are also presented graphically in the graph of spider's web (Figure 1). The different axes of the spider web graph represent related subcategories within external and internal biosecurity [11].

Data Analyses

Means, standard deviations, medians, minimum and maximum values were obtained for each subcategory variable. A correlation analyses was performed in order to investigate the correlation between farm biosecurity and farm size and internal and external biosecurity. The criteria for assessing the strength between parameters were set as following: weak (0–0.25), fair (0.25–0.5), good (0.5–0.75), and excellent (0.75–1). The scatter plots and linear regression analyses was conducted and linear equation, regression line and R² were showing in the diagrams 4 and 5. Linear regression analyses were performed to determine the relationship between farm characteristics (herd size and farm type) and internal/external biosecurity outcomes. The level of statistical significance was set at 0.050.

III. RESULTS

There were 24 dairy farms total in the study. Tables 1, 2, and Diagram one to five present the findings. The average herd size ranged from 11 to 169 animals, with a standard deviation of 40 (SD = 40).

Table 1. The global average score and the average score of 24 dairy farms based on the internal and external biosecurity category

	Description	Word average Score	Average scores 24 dairy farms
External biosecurity			
A	Purchase and reproduction	78	81
B	Transport and carcass removal	47	47
C	Feed and water	59	54
D	Visitors and farmworkers	70	41
E	Vermin control and other animals	62	68
External biosecurity		67	63
Internal biosecurity			
F	Health management	31	36
G	Calving management	31	31
H	Calf management	43	39
I	Dairy management	47	43
J	Adult management	40	51
K	Working organisation and equipment	38	27
Subtotal internal biosecurity		37	37
Total		52	50

Table 2. The mean, standard deviation, minimum and maximum of 24 dairy cattle biosecurity scores according Biocheck.UGent™ scoring system.

	A. Purchase and reproduction	B. Transport and carcass removal	C. Feed and water	D. Visitors and farmworkers	E. Vermin control and other animals	Subtotal External biosecurity	F. Health management	G. Calving management	H. Calf management	i. Dairy management	J. Adult management	K. Working organisation and equipment	Subtotal Internal biosecurity	Total
Mean	81	47	54	41	68	63	36	31	39	43	51	27	37	50
Standard Deviation	31	23	34	20	24	20	28	19	18	25	29	20	19	18
Minimum	12	0	14	12	5	18	0	8	14	5	0	3	10	14
Maximum	100	84	100	87	100	85	89	77	84	98	90	75	72	79

IV. DISCUSSION

Sustainable solutions to problems with animal health, production, and welfare depend heavily on farm biosecurity [5]. The Biocheck.UGent™ score system is utilized to quantify the biosecurity criteria of dairy farms in Albania, as there is a lack of data on these parameters. Well-validated, the Biocheck.UGent™ scoring system offers a thorough score of multiple farm biosecurity characteristics, facilitating cross-national and intra-national comparisons [8]. The Biocheck.UGent™ has a lot of promise for analysing the biosecurity score of Albanian farms and making international comparisons easier. A thorough assessment of biosecurity procedures is made possible by the fact that many of its metrics are appropriate for the biosecurity conditions of farms in Albania. The system can offer insightful information about the advantages and disadvantages of the biosecurity protocols used in Albanian farms, enabling focused enhancements. It was believed that larger and medium-sized farmers would be more interested in implementing biosecurity measures and more aware of them [4]. Using the Biocheck.UGent™ scoring approach for cattle, 24 dairy farms were assessed. The results indicate that while the farms' internal, external, and total scores were lower than the worldwide average values, they were not statistically different.

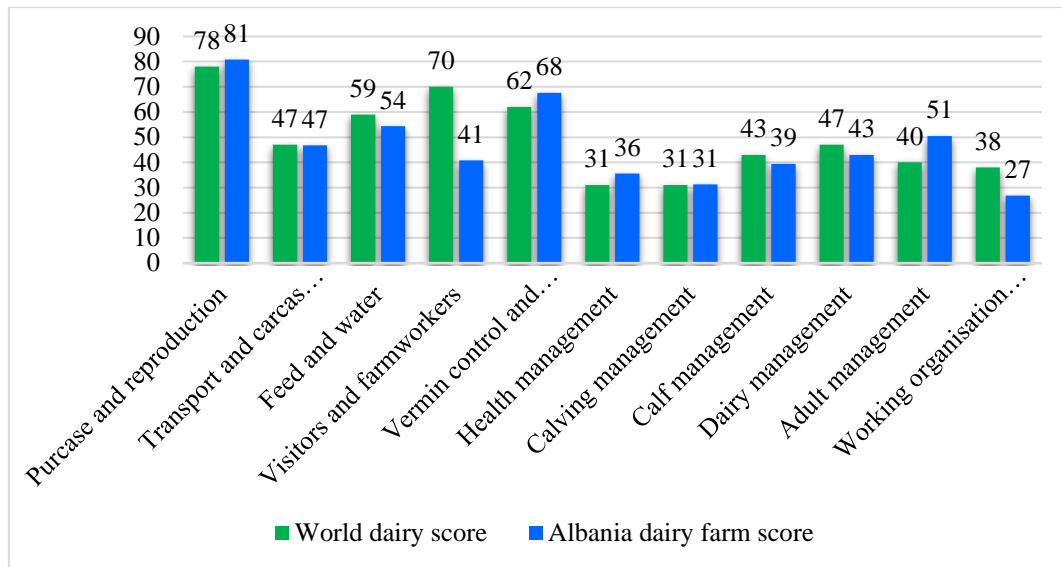


Diagram 1. Comparison of the global average scores according to the Biocheck.UGent™ scoring system assessment with the average scores of 24 dairy farms.

According to the results of the investigation, the farms' mean external biosecurity score of 49.9% was lower than the global norm of 67%. The low scores for the subcategories of "transport and carcass removal" (45.7%) and "visitors and farmworkers" (40.8%) are mostly responsible for this discrepancy. Testing new animals is not widely done until the animals exhibit clinical symptoms. Accordingly, a 2019 study [5] found that just 48% of open herds in Canada had a plan in place for reintroducing and introducing new animals, indicating a lack of widespread adoption of biosecurity measures among dairy farms. The current study also showed that there was a lack of knowledge among dairy farmers regarding quarantine procedures and how they were to be followed.

In order to stop the introduction and spread of transmissible diseases, it is crucial to promote the use of quarantine procedures as part of dairy farm biosecurity measures, according to recent studies [12]. Due to farms not acquiring cattle from outside sources, dairy herds in Belgium scored higher (80.7%) in the "purchase and reproduction" category according to a study of 2020 [3]. Farms that have done external purchases typically do not know about them and take precautions, including as testing and quarantine protocols, to reduce the likelihood of disease spread. A number of factors, including the lack of diagnostic facilities in the area and the insufficient attention placed on implementing preventive measures by lack of awareness of the advantages of early identification of transmissible diseases among farmers.

There are a number of reasons why "visitors and farmworkers" had a poor compliance score for farm biosecurity measures. Formal permission to visit farms is not seen as important due to a prevailing sociocultural norm; many farm workers also work outside the farm, increasing the risk of bringing diseases into the farm; and visitors, farm workers, and animal health professionals do not wear boots or clothing appropriate for the farm. This can be explained by farmers' unfamiliarity of the possibility of pathogen transmission via contaminated visitor footwear and apparel. Remarkably, farms typically do not give visitors personal protective equipment (PPE), and managing calving and dystocia instances frequently happened without sleeves or gloves. This reveals a concerning pattern of inadequate human biosecurity precautions in the farming sector [6]. Research has shown that sociocultural factors have a similar impact on livestock systems' compliance with biosecurity regulations in various parts of the world. These factors include cultural attitudes that obstruct the efficient application of biosecurity measures [7].

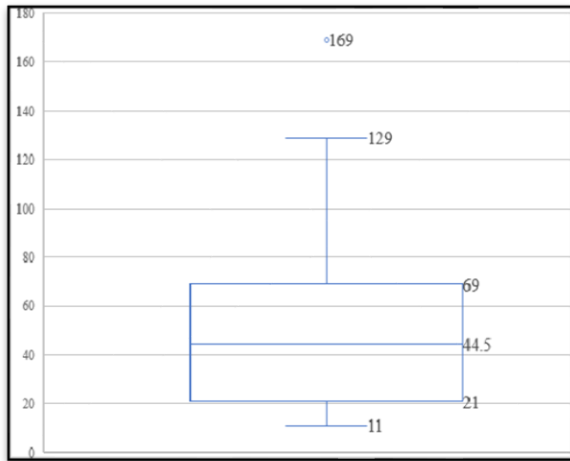


Diagram 2. A box and wicker plot indicate distribution of the 24 farms by farm size

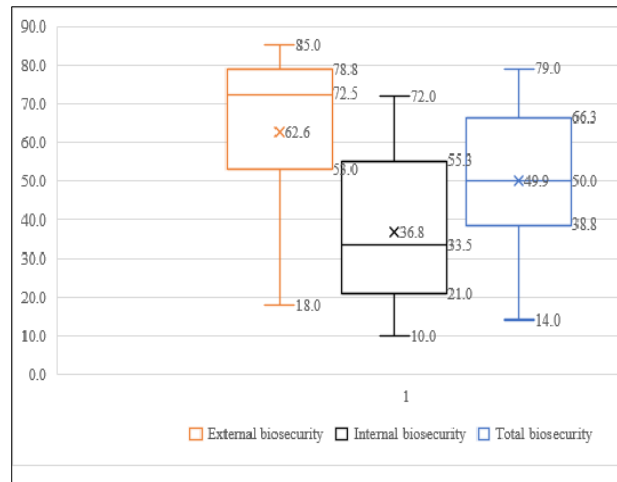


Diagram 3. The boxplot which show comparison of external, internal, and total biosecurity scores among 24 farms

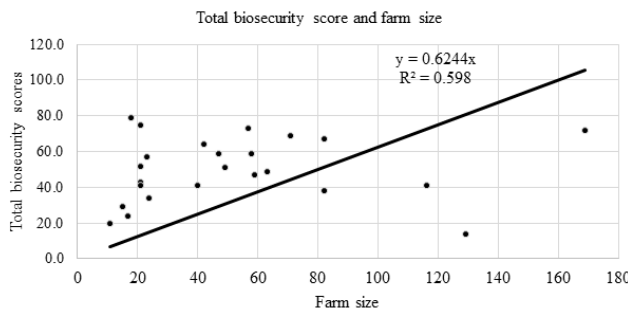


Diagram 4. Scatter plot and correlation between farm size and overall biosecurity scores. ($r^2 = 0.773$)

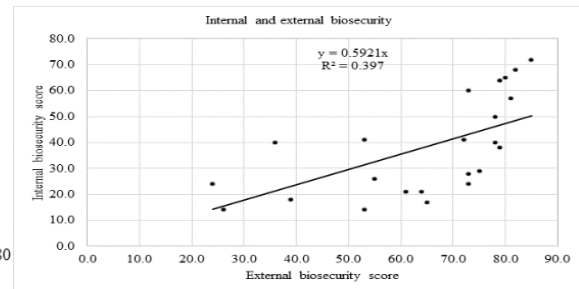


Diagram 5. Scatter plot which shows correlation between external and internal biosecurity scores ($r^2 = 0.63$)

It became apparent that the average internal biosecurity score (36.75%) was rather near to the average worldwide score (37%), with values over 37% for "adult management," "dairy management," and "calf management." This is explained by the vast experience of the participating farmers in running dairy farms; they place a high priority on the well-being of their milking animals due to their significant financial worth. The attitudes and adoption of biosecurity policies among Canadian dairy farmers were studied by Denis-Robichaud et al. (2019) [5]. The study found that there was limited application of both intra- and inter-herd measures aimed at preventing the spread of infections. The current study's overall mean biosecurity score (49.9%) was less than the overall mean worldwide score (52%). This can be stated in light of the fact that the majority of farms from Europe, where farm biosecurity compliance is aggressively encouraged, were the farms who conducted the survey utilizing Biocheck.UGentTM, [1], [8]. The herd size and the total biosecurity score of the farm, as well as the scores for internal and external biosecurity, were found to positively correlate. An "excellent" positive connection ($r^2 = 0.77$) was found between farm size and the overall biosecurity score. By using an r^2 calculation, the correlation between the internal and external biosecurity scores was evaluated. The result showed a "good" positive correlation of 0.663. This implies that, in the context of our investigation, there is a tendency for overall farm biosecurity to rise substantially as herd size grows. There is a substantial correlation between the two components of biosecurity, as seen by the positive correlation between the ratings for internal and external biosecurity. This suggests a complete strategy to biosecurity implementation, as farms that perform well in one biosecurity dimension are likely to do well in the others as well.

The importance of socio-cultural factors and field veterinarians in implementing farm biosecurity has been highlighted by previous research [10], [2], [9]. However, in order to improve the acceptance and maintenance of biosecurity measures on farms, formal regional risk mitigation programs involving public-private collaboration must be implemented, along with training and improved biosecurity communication among farm veterinarians [10], [2], [4]. It is imperative that animal health professionals inform farmers about the need to put these biosecurity measures into practice in order to maximize biosecurity and reduce disease risks on dairy farms.

V. CONCLUSION

Despite preliminary findings, the current study highlights the significance of implementing quarantine protocols, being aware of how to dispose of cadavers and placentas, using equipment, clothing, and boots specific to a given compartment, implementing insect, bird, and rodent control measures, placing a proper emphasis on calf management, and adhering to biosecurity protocols for both workers and visitors.

This study shows that the chosen dairy farms' mean biosecurity scores for both internal and external elements were lower than the global average and that these are the main areas that need to be improved. Larger farms are said to generally have superior biosecurity procedures based on a positive association found between herd size and total biosecurity ratings. The research makes it clearly evident that a more quantitative evaluation of the biosecurity procedures used in the area is required in order to develop an evidence-based practice package.

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