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The prevalence of loser cows in extensive breeding systems in Transylvania

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Abstract: The loser cow concept was introduced in scientific literature in 2005, by the Danish researcher Thomsen, referring to the cow 'unable to keep up with the rest of the herd'. Since in Transylvania (Romania) the great majority of cattle are kept in extensive breeding systems, in small and middle sized farms, the purpose of the present study was to establish the prevalence of loser cows in such systems. The identification of loser cows was done based on a clinical protocol including 7 clinical signs, from which the loser cow score was calculated. Seven hundred and sixty nine cows in 123 small farms (2-15 cows/farm) in Transylvania were evaluated. The prevalence of loser cows in the investigated farms was between 0% and 13.3%. The overall prevalence of the loser cows (in 769 assessed cows) was 1.82%, a figure that can be considered low. Our study was meant to present a global image of the loser cows in a traditional type of animal housing, still present in Romania as well as in many other regions of the world.

Key words: Loser cow, extensive breeding system, clinical protocol, prevalence

Introduction

The first mention of the loser cow concept in the scientific literature was made in 2005 by Thomsen (1). The Danish researcher's project was performed mostly in dairy herds with intensive breeding and loose housing systems, but the research and the application of the clinical protocol identifying the loser cows can be carried out in any type of breeding system. In Transylvania (Romania) the majority of cattle are kept in extensive breeding systems with tie-stalls (small and middle size farms) (2). In Transylvania there are 676,653 cattle (3), mostly in small farms. For this reason our study focused on identification of loser cows in extensive breeding systems. The accomplishment of this study in Transylvania allows further extension of the research over the whole country and the possibility of comparison between different breeding systems.

As emphasized by Thomsen, the loser cow status represents a relatively new clinical entity of the animal, a clinical reality, with obvious consequences, both for the cow and for the farmer (1). The loser cow

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is an animal defeated by the environment as well as by its own condition, which results in suffering. The loser cow is different from a sick cow, lame cow, thin cow, or a cow in poor welfare. The loser cow term represents a possible combination of several of these conditions and, at the same time, it exceeds, to a certain degree, each of these clinical entities (1). By keeping the loser cow, the farmer incurs loss of profit and decreased production on the one hand and an increased workload on the other (4). The loser cow requires extra care and attention in the attempt to achieve some productive rehabilitation and to get some value out of it; the complete recovery of the animal is usually impossible.

The aim of this work was to assess cows in extensive breeding systems within Transylvania by means of the clinical protocol elaborated by Thomsen (1) and Thomsen et al. (4), to identify loser cows according to the obtained scores, and to establish the prevalence of loser cows.

Materials and methods

The research was carried out in 123 small farms (2-15 cows/farm) in Transylvania. Seven hundred and sixty nine cows kept in tie-stalls were assessed by means of the observational cross-sectional study with simple random sampling methods.

The cows are kept permanently tied on stalls, in shelters, during the cold period of the year (5 – 6 months per year) and freely grazing all day long in the warm period of the year (6 – 7 months per year). In the evening, they return to the barns and are tethered for night. All the shelters were alike in terms of construction features: reduced sizes, without paddocks, with some facilities only for feeding and watering, and inadequate to animal welfare. The feeding, watering, milking, and barn cleaning are carried out by manpower. The cows rest, feed, and are milked in the stalls. The stall floors were concrete, covered with a thin layer of straw. The cows' places in the stalls were not delimited in the majority of the shelters.

Before the start of the study, the necessary sample size was computed to determine the adequate size to obtain a good precision (Confidence Interval = 95%) for the population prevalence. The sample size should be ample enough to be able to extrapolate the results over the whole population, but it should not be overly large to imply unnecessary costs (5). The sample size calculated with the formula proposed by Daniel (6) was n = 753 cows. In order to establish the expected proportion (expected prevalence) a preliminary pilot study on 28 cows in 8 herds was carried out resulting in a prevalence of 2%. The proof for the assumption of a normal approximation was carried out. The correction for finite population was not necessary because $n/N \leq 0.05$ (5). Because the sampling was carried out by simple random method, we came to a final sample size of 769 cows, thus having assessed all the cows in 123 farms. The number of cows and of the farms with 2-15 cows from Transylvania, and the cow-numbers in each farm were provided by the National Institute of Statistics (3) and the General Association of Cattle Breeders (2). All the farmers voluntarily agreed to take part in the study. The data sampling and the study covered the period from March 10th to May 2nd 2008.

In order to identify the loser cows, the clinical protocol devised by Thomsen (1) and Thomsen et al. (4), which includes 7 clinical signs (Table 1), was used. The cows were assessed before the beginning of the grazing period. Every cow was assessed once, tied in the barn and untied outside (for the locomotion scoring), by 2 researchers with practical experience. Only when there were disparities between the results of the 2 observers, those cows were assessed once again. The loser cow score was calculated according to the method described by Thomsen (1) and Thomsen at al. (4). The scores given for the clinical signs were quantified in points. The normal condition and minimal deviations from normality, considered as no clinical importance, were assigned the value '0'. To recognize the greater clinical importance of higher scores, we used a geometrically progressive scale (powers of 2: 20, 21, 22, 23). This method has been described by Thomsen (1), and by other authors as well (7,8,9). The assigned points for each clinical sign are shown in Table 1. The conversion into loser cow score was defined as the sum of the points for each of the 7 clinical signs. In this way each cow was assigned a loser cow score ranging from 0 to a theoretical maximum of 32. Cows with a score of 8 or more were classified as loser cows (1). Finally, the prevalence of the loser cows was calculated in each farm as well as the overall prevalence.

Table 1. Description of the clinical protocol used in identification of loser cows in Transylvania and the points allocated for each clinical sign – after Thomsen (1).

Clinical sign and scores	**Points**
Lameness (from Sprecher et al., 1997)	
1: Normal: The cow stands and walks with a level-back posture. Normal gait.	0
2: Mildly lame: The cow stands with a level-back posture but develops an arched-back posture while walking. Her gait remains normal.	1
3: Moderately lame: Evident arched-back posture while standing and walking. Her gait is affected, short-striding with one or more limbs.	2
4: Lame: An arched-back posture is always evident and gait is best described as one deliberate step at a time. The cow favors one or more limbs/feet.	4
5: Severely lame: The cow additionally demonstrates an inability or extreme reluctance to bear weight on one or more of her limbs/feet.	8
Body condition score (BCS) (modified after Ferguson et al., 1994)	
1: Fat: BCS ≥ 4.	0
2: Normal: 2.25 ≤ BCS ≤ 3.75.	0
3: Thin: 1.5 ≤ BCS ≤2.	4
4: Emaciated: BCS≤1.25	8
Hock lesions (only the most severe lesion found is scored)	
1: No hock lesions: without contusions, abscesses, hair loss, skin thickening.	0
2: Hair loss and/or slight thickening of the skin and/or wounds, diameter ≤ 2 cm.	0
3: Hyperkeratosis and swelling of the skin and/or fluid filled bursa and/or larger wounds (diameter > 2 cm).	1
4: Larger swellings with hyperkeratosis and fluid filled bursa, abscesses. Wounds, suppurative lesions, lesions of the hock joint and/or bones may be present.	2
Other skin lesions (hips, neck, ribs, legs, back or other parts of the body besides hocks) (only the most severe lesion found is scored)	
1: No lesions: no contusions or abscesses, no hair loss, no thickening of the skin.	0
2: Hair loss and/or slight thickening of the skin and/or wounds ≤ 2 cm Ø.	0
3: Hyperkeratosis and swelling of the skin and/or fluid filled bursa and/or larger wounds (>2 cm Ø).	1
4: Larger swellings with hyperkeratosis and fluid filled bursa, abscesses. Wounds, suppurative lesions, lesions of the hock joint and/or bones may be present.	2
Vaginal discharge	
1: No vaginal discharge.	0
2: Vaginal discharge seen from the vagina and/or on the tail and/or perineum.	2
Skin condition	
1: Skin shiny, no or only a little dust on the back.	0
2: Skin dull, dust on the back of the cow.	1
3: Skin very dull, much dust on the back, image of a cow not cleaning herself.	2
General condition	
1: Undisturbed general condition.	0
2: Slightly disturbed general condition, slight dullness, slightly depressed	4
3: Disturbed general condition, very dull, depressed, grinding of teeth might occur.	8

Results

The assessment of the cow results, based on the clinical protocol, is shown in Figure 1. It can be observed that from the 769 cows, 275 (35.76%) were thin, having a body condition score (BCS) of 1.5-2; 235, namely 30.55%, had dull skin, with dust on the back; 14, that is 1.82%, had very dull skin; 99 (12.87%) presented vaginal discharges; 33 cows, namely 4.29%, showed moderate lameness (score 3); and 27, i. e. 3.51%, had hock lesions bigger than 2 cm in diameter. The general condition was good in all the assessed cows.

The distribution of the loser cow scores in the 769 assessed cows is shown in Figure 2. In the 769 investigated animals, we identified 14 loser cows, with the scores of 8 (8 cows), 9 (3 cows), and 11 (3 cows), respectively. The mean loser cow score was 2.54, the minimum score obtained was 0 and the maximum score was 11.

The prevalence of loser cows in the 123 studied farms was between 0% and 13.3%. The overall prevalence of loser cows in the 769 evaluated animals was 1.82%.

Discussion

The clinical protocol used in identification of loser cows was elaborated by Thomsen (1) and Thomsen et al. (4) and validated by Thomsen and Baadsgaard (10). The application of this protocol proved to be easy, quick, and non-invasive at the same time; it does not affect at all the investigated animal's welfare. The application costs are low, proving the research method to be economically efficient. The clinical protocol is suitable for use by veterinarians in screening work as well as by farmers for periodical assessment of the herds. In this respect, the clinical protocol is suitable for assessment of cattle in any housing and breeding system.

The period of our study, March – May 2008, allowed the assessment of cows in tie-stalls, after a whole winter inside the shelters. Some of the cows did not leave the shelter at all in the previous 5 – 6 months. In these circumstances we expected a maximum for the prevalence of loser cows. Thomsen (1) found that the mean loser cow score is the lowest in the summer (June – August) and it is the highest in spring (March – May). Therefore, we can assume that the obtained result reflect the maximum prevalence of loser cows in Transylvania. At the same time, we were able to identify those relevant clinical signs with maximal weight within the loser cow score structure in Transylvania at this period of the year. We noticed that the highest and most frequent deviation from normality is in the body condition score (BCS). The cause might be the insufficient amounts of fodder in this period of the year. It is proved that the extreme deviations from the ideal body condition are relevant for the health and welfare of cows (11,12). The second most abnormal clinical sign was the skin condition. The aim of this score is to show whether the cow is capable of self-grooming (13,14,15). The lack of self-cleaning results in sickness, poor general condition, and inability of certain movements. In our study this result could be influenced by the fact that the cows were housed in tie-stalls, the majority of tethering

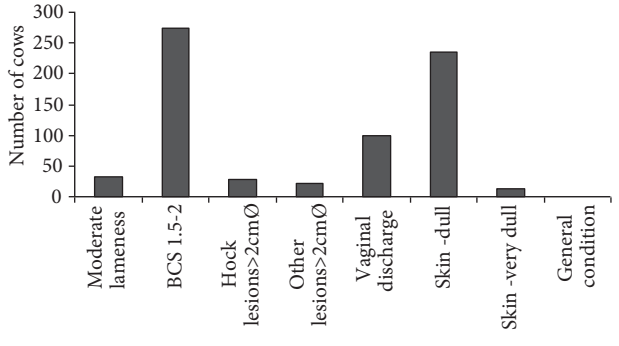

Figure 1. The distribution of the clinical signs assessed in the identification of loser cows in Transylvania.

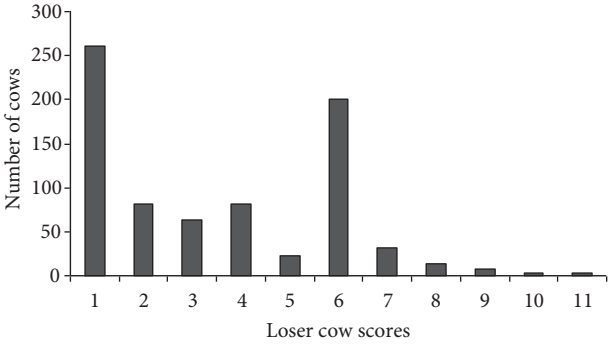

Figure 2. The distribution of loser cow scores in the 769 investigated cows in Transylvania.

systems were inadequate, and therefore the animals' movements were limited. The vaginal discharges are the next modified clinical sign in terms of percentage, but this score has a lower relevance as it does not consider the cause and the aspect of the discharge, which can be physiological (in estrus for example). The presence of vaginal discharge can be omitted in the case of discontinuous discharges, which disappear for certain movements of the cow (1). Compared with the results of other studies (16,17,18), lameness had a surprisingly low proportion. Many authors showed that the lack of exercise and privation of pasture lead to enhancement of feet problems (19,20,12,21). The percentage of hock lesions is significantly lower than that observed in other studies (22,23), probable due to the small numbers of cows in the investigated farms. Several studies regarding the prevalence of hock lesions in free-stall housing have been conducted; however, little information has been reported on the prevalence of hock lesions in tie-stall housing. Weary and Taszkun (22) found that 73% of the cows in 20 free-stall farms had at least 1 area of hock hair loss or skin breakage. Zurbrigg et al. (23) stated that the hock lesion prevalence in tie-stall farms was 44%. Injuries to the hocks have been associated with stall length, stall bed surface, and bedding type (24,25). Other possible factors include stall width, tie-rail height, the size of the cow, and its health status. An improperly designed stall could make rising and lying behaviors difficult and result in more injuries to the hocks. The only unaltered clinical sign was the general condition. The general condition refers on the mental status of the cow (bored, dullness, and depression), if the animal is receptive and pays attention at what is going on in its closed environment (1).

According to the obtained results, the prevalence of loser cows in the 123 studied farms was between 0% and 13.3%. Thomsen (1) and Thomsen et al. (4) established the prevalence between 0% and 11.5%, in 39 farms with intensive breeding, loose housing system (more than 100 cows/farm). Our result of 13.3% is indicative of the fact that the investigation was made in small farms. The 14 cows identified as loser cows were in 13 farms with 8 (1 farm), 12 (5 farms), and 15 (7 farms) cows, respectively. Only in a single farm with 15 cows were found 2 loser cows.

Regarding the distribution of the scores within the 769 assessed cows, we found the highest frequency for the score '0'. The next score in frequency was the score '5', the other scores had much lower frequency. In the research made by Thomsen (1) and Thomsen et al. (4), the highest frequency was in scores '1' and '2', respectively. The high frequency of score '5' in our research was due, in most of the cases, to the association between a low BCS (thin cows) with skin dullness. The mean and minimal loser cow scores are the same with the ones observed by Thomsen in his study, and the maximal score is half of the value obtained by the Danish researcher (1,4).

The overall prevalence of loser cows in the assessed 769 cows was 1.82%, and it can be considered low. The only study for comparison is Thomsen's work (1,4), where he found an overall prevalence of 3.24%, significantly higher. The possible explanation of this low prevalence of loser cows could be found in the type of the farms we studied. The farmer who keeps cattle in an extensive system, especially in tie-stalls, is forced to manipulate the animals several times per day for specific activities (feeding, milking, and cleaning the shelter). In this way, the farmer will in most cases notice every problem of each cow, at an early stage, thus being able to take early remedial measures, preventing the change-over of a healthy cow into a loser one.

Based on the results of the present study, we concluded that the prevalence of loser cows is low in Transylvania, in farms with extensive breeding system. We found, as well, that the clinical protocol for the identification of loser cows proposed by Thomsen (1) and Thomsen et al. (4) is easy to apply in the field, quick and useful both for the farmer and for the veterinarian, and totally harmless for the cow; it is a non-invasive research method, respecting the welfare of assessed animals.

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