

ESTABLISHING THE CAUSAL FACTORS IN THE DEVELOPMENT OF CHORIOPTIC MANGE IN CATTLE

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Summary

Establishing the causal factors in the development of chorioptic mange in cattle from I.C.P.C Brașov were achieved in tow stages (2000-2001; 2001-2002) and allowed the classification of cattle as sources of *Chorioptes bovis* with a direct role in the transmission of mange, 78.63% (between 2000-2001) and 78.69%(between 2001-2002) of the receptive individuals were susceptible; 2% were susceptible and showed clinical signs, 35.77%-36.32% of the receptive and susceptible animals did not show clinical signs; 42.85%-41.32% of the population were receptive unsusceptive. For evaluating "milk production" as a risk factor in contracting the disease, we obtained *Odds ratio* values of 1.15 (2000-2001) and 1.37(2001-2002), which indicates that a milk production higher than 20l/day is a important risk factor in the clinical manifestation of the disease.

Analytical epidemiological studies in cattle mange are necessary for establishing certain aspects referring to the sources of infestation, the receptiveness of the organisms and the transmission method of the disease. These correlated with information obtained in the descriptive epidemiological study provides data concerning: the type of evolution of the mange hotspots; implication of favorable conditions: the importance of the phenomenon of resurgence in the transmission of the disease within the population. (Thrusfield, 1986; Toma et al., 1998; 2000).

Materials and methods

In case of chorioptic mange hotspots identified in I.C.P.C Brașov we considered of great importance the identification of facilitating circumstances in the transmission of the disease and the increased risk of manifestation and development in the population. In view of the observations of the developmental dynamics of the hotspots, internal and external factors that determine receptivity, animal productivity, possible ways of transmission in the population, we quantified risk analysis through statistical associations between the disease and various factors that may intervene in its development. The study undertook to certify and evaluate the risk factors, as for the explanation of the causal mechanisms, had a main purpose of evaluation the intensity of the relation between causal factor and disease which was estimated through the relative risk value the relative risk was

expressed through the *Odds ratio* (OR), according to the algorithm used in CASE-WITNESS epidemiological inquires (Toma et al., 1998; Bouyer et al., 1994):

$$OR = (A \times D) / (B \times C)$$

In which:

A = total number of animals with skin lesions and microscopic confirmation of mange diagnosis, of the population exposed to the maximal risk of infestation.

B = the number of animals without skin lesions exposed to the maximal risk of infestation

C = the number of animals with skin lesions exposed to the minimal risk of infestation

D = the number of animals without skin lesions exposed to the minimal risk of infestation

Interpretation of OR values were done as following: (Schwartz, 1992; 1994; Toma et al., 1998):

- **OR** ≤ 1 – no association between the studied risk factor and the development of the disease
- **OR** > 1 important association between the studied risk factor and the development of the disease.

Statistical validation of the results, OR values, was done in view of trust interval of 95% (IC 95%) and the probability index “p”, calculated using the Fischer Test in the analysis system ANOVA - GraphPad In Stat Program (Schwartz, 1992; Motulsky, 2004).

Results and discussions

Categorization of the cattle, from the studied population, between November 2000 and May 2002, in view of the reaction to *Chorioptes bovis*, led to the grouping of the individuals as shown in table 1

Table 1

Classification of cattle from I.C.P.C. Brașov according to the receptivity to *Chorioptes bovis* (2000-2002)

| Type of cattle in view of receptivity | | Time interval | | | |
|---------------------------------------|-------------------------------|---------------|--------------|-------------|--------------|
| | | 2000 - 2001 | | 2001 - 2002 | |
| | | Nr. | % | nr. | % |
| Receptive cattle | | 666 | 78,63 | 676 | 78,69 |
| Receptive susceptible cattle | with clinical signs | 19 | 2 | 18 | 2 |
| | without clinical signs | 303 | 35,77 | 321 | 36,32 |
| Receptive unsusceptible cattle | | 363 | 42,85 | 355 | 41,32 |

In case of chorioptic mange hotspots we considered as being receptive cattle from all categories with the exception of calves between 0 and 6 months of age, numbering a total of 181 between 2000 and 2001 and 183 between 2001 and 2002. This premise was based upon the fact that bovine chorioptic mange afflicts mainly lactating cows and calves between 6 and 8 months (Cosoroabă, 2000; Șuteu and Dulceanu, 2001).

Thus in the studied population the percentage of receptive cattle was of 78.63 (2000-2001) and 78.69 (2001-2002) receptive an susceptible cattle were divided in 2 categories with clinical signs 2% and without clinical signs 35.77%-36.32% of all receptive cattle (table 1). We consider the later as especially important in the transmission of the disease in the population, being organisms capable of being infested without clinical signs. This aspect is due particular biology of the parasite and individual reactivity of the infested animal. An other category was represented by cattle receptive unsusceptible which represented 42.85%-41.32% that represented animals in the minimal risk of infestation (table 1)

Globally viewed, the receptivity situation in cattle to chorioptic mange shows that in the studied population the number of clinical cases was small (2%), as the number of animals possibly infested was rather height, these aspects were shown in lactating cows. The development of the disease only in this category is due to the intervention of internal factors that may influence receptivity: age, physiological status and level of productivity. In this sense it must be taken into account that individuals highly specialized in certain productions are more sensitive; high milk production strains the organism to the point of metabolic and/or hormonal imbalances.

Transmission of chorioptic mange in the population of lactating cows was slow the monthly number of newly reported cases being small. Cosoroabă (2000) shows that chorioptic mange is mildly contagious, which would explain the low diffusion rate in the hotspot.

Developmental dynamic was influenced by external factors of which we mention as especially important the welfare of the animals. Cattle from I.C.P.C Brașov, in the studied period were kept in excellent conditions of hygiene, ensuring balanced food rations adequate for every age group. Another factor that influenced low numbers of cases was the upholding system during the stabulation period. Lactating cows were kept using the "tied" system, which decreases the risk of infestation and implicitly the direct transmission of the disease.

Regardless of the proper welfare of the animals and the adequate conditions of raising and exploitation, in each period the cold season determined new cases of the disease while in warmer season clinical cases were no longer evident. As a general low in chorioptic mange clinical signs appear in autumn, rise in winter and diminish in spring with the taking to pasture the pathological process regresses (Bowman, 1999; Cosoroabă, 2000; Șuteu and Dulceanu, 2001). Practically, in the hot season the mange mites retreat in the regions of the body protected from sunlight, were they remain until favorable conditions are once again

available. This particularity in the parasite's biology is very important in the analysis of the cyclic development of the disease and the risk of potential infestation maintaining a high degree of diffusion. We highlight the fact that cattle with clinical signs of chorioptic mange are in the cold season the main source of infestation; animals without clinical signs, considered as asymptomatic carriers are sources in both warm and cold seasons, sources of lesser intensity but insidious and stable.

In view of the aspects highlighted in the development of chorioptic mange we considered appropriate to quantify the factors that may determine the rise of the probability of manifestation of the disease in the population.

It has been noticed that chorioptic mange has been diagnosed only in lactating cows between 3 and 10 years of age. In view of this we considered "age" as a risk factor for the disease; for quantification animals were classified according to table 2

- A** - the number of adult cattle (lactating cows – reformed cows) with skin lesions and microscopic confirmation of mange diagnosis (n=19-18)
- B** - the number of adult cattle (lactating cows – reformed cows) without skin lesions (n=234-243)
- C** - the number of cattle in the population (except adult cattle and calves between 0 and 6 months) with skin lesions (n=31-23)
- D** - the number of cattle in the population (except adult cattle and calves between 0 and 6 months) without skin lesions (n=290-303)

Table 2

Classification of the cattle from I.C.P.C. Brasov in order to quantify the "age" risk factor (2000-2002)

| Analysed risk factor: | A: adult cattle with skin lesions and microscopic confirmation of mange diagnosis | | B: adult cattle without skin lesions | |
|-----------------------|---|------------------------|--------------------------------------|-------------------------|
| | Age between: 3 -10 years | 2000-2001 19 | 2001-2002 18 | 2000-2001 234 |
| Age under: 3 years | C: cattle with skin lesions | | D: cattle without skin lesions | |
| | 2000-2001 | 2001-2002 | 2000-2001 | 2001-2002 |
| | 31 | 23 | 290 | 303 |

Having in mind this categorization of the animals, evaluating the relative risk through the calculation of the OR showed low values 0.75 (IC 95%= 0.41-1.37) for the interval between 2000 and 2001, and 0.97 (IC 95%=0.51-1.87) for 2001-2002 which means that age is not the risk factor of chorioptic mange, existing the

possibility that other factors may intervene in the development of the disease. Beginning from this hypothesis we verified the influence of the productivity level on the disease, quantifying statistical and biological associations between milk production and chorioptic mange. For this purpose lactating cows were classified according to table 3.

- A** - the number of lactating cows with skin lesions and microscopic confirmation of mange diagnosis with a milk production of over 20 l/day (n=7-8)
- B** - the number of lactating cows with or without skin lesions and without microscopic confirmation of mange diagnosis with a milk production of over 20 l/day (n=1.2-115)
- C** - the number of lactating cows with skin lesions and microscopic confirmation of mange diagnosis with a production of milk of less than 20 l/day
- D** - the number of lactating cows without skin lesions and without microscopic confirmation of mange diagnosis with a milk production of less than 20 l/day (n=201-197)

Table 3

Classification of the cattle from I.C.P.C. Brașov in order to quantify the “milk production” risk factor (2000-2002)

| Analised risk factor | A: lactating cows with skin lesions and microscopic confirmation of mange diagnosis | | B: lactating cows with or without skin lesions | |
|---------------------------------------|---|-----------|--|------------|
| | 2000-2001 | 2001-2002 | 2000-2001 | 2001-2002 |
| Milk production of over 20 l/day | 7 | 8 | 102 | 115 |
| Milk production of less than 20 l/day | C: lactating cows with skin lesions and chorioptic mange | | D: lactating cows with or without skin lesions | |
| | 2000-2001 | 2001-2002 | 2000-2001 | 2001-2002 |
| | 12 | 10 | 201 | 197 |

Through the evaluation of the relative risk we obtained OR values of 1.15 (IC 95%=0.43-3.00) for the interval between 2000 and 2001 and 1.37 (IC 95%=0.52-3.57) for 2001-2002. even if these values are not ensured statistically, the fact that they are above 1 allow us to state that in the analyzed chorioptic mange hotspot, a milk production of over 20 l/day is a risk factor in the manifestation of the disease, to this being added favorable circumstances to the development of the parasite in the cold season. Chorioptic mange affects mainly cattle specialized for milk production and is considered am mildly contagious. In

this sense, Șuteu and Dulceanu (2001) observes the presence of the disease in Bruna de Austria and the Holstein-Ftiza hybrids, in which it affects over 50% of the population, but may appear in indigenous raises.

Conclusions

Establishing the causal factors in the development of chorioptic mange in cattle from I.C.P.C Brașov were achieved in tow stages (2000-2001; 2001-2002) highlighted the following:

1. Categorization of cattle as sources of *Chorioptes bovis*, whit a role in the direct transmission of the disease, has shown that:

- 78.63% and 78.69% were receptive;
- 2%were receptive susceptible whit clinical signs, and those without were 35.77%-36.32% of the receptive animals;
- receptive unsusceptible cattle represented 42.85%-41.32% of the population.

2. Through the quantification of “milk production” as a risk factor we obtained *Odds ratio* values of 1.15 and 1.37, which indicates that milk production of over 20 l/day is an important risk factor in the development and clinical manifestation of the disease.

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