

PROBLEMS OF ERADICATING *BRUCELLA MELITENSIS* FROM SMALL RUMINANT FLOCKS IN MOUNTAIN AREAS OF PORTUGAL

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La distribution et la sévérité de la brucellose humaine dans des zones de production ovine et caprine où des petits troupeaux prédominent, souligne l'importance de ces espèces comme source de l'infection humaine ainsi que le besoin urgent d'améliorer la maîtrise de cette maladie en vue de l'éradication.

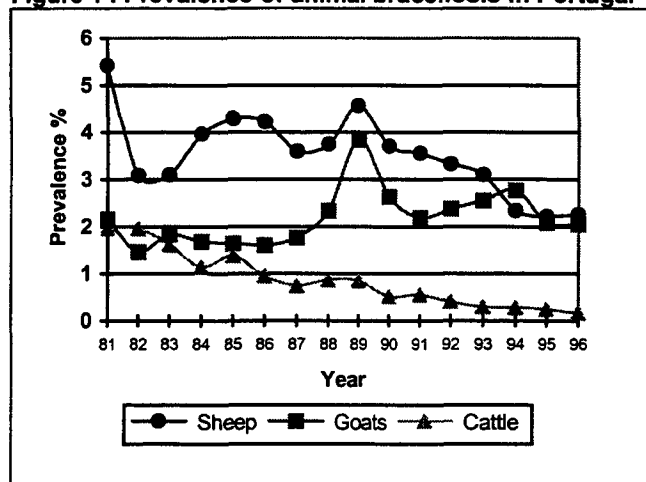
Comme résultat d'une campagne d'éradication de 6 ans, la prévalence de la maladie a été réduite et la qualité des services améliorée, mais il existe encore de nombreux obstacles pour l'éradication. En particulier, il s'agit de certains contrôles techniques spécifiques et du contrôle des mouvements des éleveurs ayant des implications sur la gestion des troupeaux.

Les voies d'amélioration du programme ont été identifiées et discutées, avec référence à l'importance de considérer l'éradication de la brucellose comme partie d'une aide intégrée à l'industrie fromagère ovine.

INTRODUCTION

Brucellosis control in Portugal began in the fifties but eradication was started only in 1990 with support from the European Union. The programme in cattle had reduced national brucellosis prevalence from 2% at the start, to 0.16% by 1996. However, the decline in sheep and goats *Brucella melitensis* prevalence, had been much slower and 2.26% of sheep and 2.05% of goats were still believed to be infected in 1996 (Figure 1).

Figure 1 : Prevalence of animal brucellosis in Portugal



The core of the small ruminant problem seemed to be in the interior region of the country, in marginal areas, where sheep and goats production is a key rural industry. In these regions, Tras-os-Montes, Beira Interior and Alentejo, the proportion of sheep flocks found to be infected in 1996 was, respectively, 44.0%, 27.9% and 10.2%.

With the aim of finding ways of accelerating the brucella eradication programme in small ruminants, the author undertook a study of the constraints on the programme and the most important risk factors in Serra da Estrela region. This is a mountainous area in the centre of the country and consists of parts of the political regions of Coimbra, Viseu and Guarda.

Serra da Estrela farmers are served by an Animal Health Defence Group (ANCOSE-ADS), a state subsidised producer association set up

to implement selected animal health schemes.

The small ruminants production system is oriented to sheep cheese production and flocks are small to medium in size, with an average of 45 sheep and 5 goats. The findings summarised in this paper and reported in full in the author's PhD thesis (Vaz 1996) were based on records and information generously provided by the ANCOSE-ADS for the years 1989-1994 and from a personally conducted questionnaire survey on 110 randomly selected farms. Additional data and information were obtained from the official veterinary service, diagnostic laboratories and, on human infection, from the national health authorities.

ERADICATION PROCEDURES

One of the main responsibilities of the ADS was the tagging and blood sampling of animals for brucella tests. Samples collected were submitted to the Rose Bengal test (RBT) at one of the private regional laboratories and positive results were confirmed by the Complement Fixation test (CFT), since 1993. Positive animals were then marked by an official veterinarian of the local State Service and later collected, by dealers working for the programme, for slaughter at an approved abattoir. Compensation was paid to farmers by a national funding agency by direct bank transfer. Current policy requires the retesting of positive flocks 6-12 weeks after the removal of the positive animals. Following two consecutive retests with no reactors the flock could be classified as "Provisionally Free" and after two more free tests at an interval of 4-6 months it could be certified as "Brucellosis Free". To achieve the status of "Officially Brucellosis Free", in accordance with the EU standard, the

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flock has to undergo three further years of tests (with 5-9 months interval between samplings) and remain free of reactors. Flocks achieving this status must also contain no animals that have been vaccinated within the previous three years. Movement of animals between flocks was also subject to control on the basis that no flock should receive animals of a test status lower than its own category.

PROBLEMS IDENTIFIED IN SERRA DA ESTRELA

A wide range of explanations were found for the relatively slow progress achieved in the eradication of small ruminant brucellosis. These could be grouped into human and managerial factors, operational difficulties in implementing the eradication programme and generalised problems of the region.

Human and Managerial Factors

The underlying problem revealed by the study was the marginal profitability of sheep cheese production in Serra da Estrela as discussed by Gulbenkian (1993). Flocks were generally small in size, installations for housing were poor and management of flocks was mainly in the hands of aged farmers with very limited scientific knowledge and technical experience. The 615 human brucellosis cases reported from 1989 to 1994 in this area, represent 8.5% of the national cases in the same period. 50.2% of these cases were attributed to direct contact with sheep and goats and a further 20% were associated with "contact with animals" which can also include small ruminants. Nevertheless, the farming population displayed limited knowledge of brucellosis. Although farmers can recognise brucellosis in the flock as a risk to family's health, very few farmers understood the mechanisms of transmission to humans, nor did they understand the purpose of the control measures being applied or the ways in which infection could spread within and between flocks.

The semi-intensive production system, with housing at night, specially in the winter months, and milking twice each day, brings healthy and infected animals into close contact and favouring the spread of infection.

Logistic linear regression analyses of several management aspects that could be related to brucellosis infection, revealed that the introduction of replacement animals, especially when purchased from dealers was an important factor in the development of infection. Transhumance of the flock to summer pasture was also implicated as a mechanism of spread. A further factor favouring spread was found to be an extended lambing season with first parturition females giving birth after the adult females, which meant that young females were in early pregnancy while older ewes were already giving birth and possibly spreading infection.

This combination of problems pointed to the need for the development of an educational programme which improves flock management procedures so as to minimise the brucellosis risks and shows farmers how to protect themselves and their families against infection. Such an educational programme should also be extended to other participants in sheep farming, cheese production and other industries involving handling of animal products.

Operational problems of the eradication programme

It is not surprising that difficulties arose in attaining the objectives of the programme in the harsh conditions of Serra da Estrela. Extremes of weather and poor communications made it extremely difficult for veterinary staff to reach the widespread and isolated small flocks, collect samples and ensure that follow-up procedures were carried out. Over the period studied, only 44% of flocks and around 70% of animals were brought into the programme and the retesting procedure within 6-12 weeks only began to become routine toward the end of the period. Shortages of staff also meant that tests were done as and when possible and could not be made to coincide with late pregnancy when infection was most likely to develop. The extent of coverage has also faced budgetary constraints. The systematic testing of flocks, until they can be certified as brucella-free and consequently requiring a less frequent follow-up, could save funds for investigation of new flocks.

Problems were also encountered in identifying positive animals. Infected animals should have been officially identified within 8 days of a positive test result and removed to slaughter within 45 days. Data analyses indicated long delays between blood sampling and the laboratory test result and an average delay of 37 days to identification. When these are added to the period allowed for removal (which is more than 45 days in 35% of cases), known infected animals could have been present in some flocks for as long as three months. There were problems, too, in the identification of positives due to unexplained disappearances, loss of tags and the general absence of records on what happened to individual animals on farms. Some may have been genuinely lost but the fact that payment of compensation could be delayed for months undoubtedly tempted farmers to sell of positive animals before the dealer came to collect them.

A further problem relates to policy on Rev.1 vaccination. It is included as part of the programme but is viewed with doubt by veterinary staff and farmers although it may still have a role in dealing with infection in large flocks. Analyses showed that medium and large size flocks tended to encounter more difficulty than small flocks in eliminating brucellosis by test and slaughter. It may therefore, be appropriate to formalise vaccination policy in large infected flocks reducing the delays and costs of achieving eradication.

While the laboratory testing procedure provides a satisfactory basis for the current programme, with an estimated positive predictive value of 88%, the rates of delivery and processing of samples need to be speeded up. For the future it may also be necessary to seek alternative tests or standards, which could provide greater specificity and thus detect infected animals with greater reliability.

A final problem requiring further consideration is that of the basis for decisions on certification of the brucellosis status of a flock. At present a single positive reaction in a flock which has achieved potential freedom status lowers its certification to "infected flock". If one positive result is found in a brucellosis-free flock, positive animals are slaughtered, certification is suspended and the test is repeated for all flock. As the programme progresses

the interpretation of serological test results will become more difficult and it will be necessary in reaching decisions to take into account other epidemiological factors including herd size and history and the situation in the area in which the flock is located. Furthermore, the criteria to consider a flock positive or negative, based on individual serological tests, should be evaluated taking into consideration the flock level specificity and sensitivity with different cut-point numbers of reactors.

This group of problems points to the need for further rationalisation of eradication measures so as to make more efficient use of the limited resources available. The above observations suggest that with the reductions in prevalence now being achieved, it should be possible to adopt varied tactics according to the extent of infection in different types and sizes of flock. More thorough recording and analyses of findings for flocks and areas will indicate where savings, greater efficiency and faster progress toward eradication can be achieved. Meanwhile, monitoring and evaluation of follow-up procedures such as tagging, transport and disposal of positive animals should help to reduce the risks of renewed spread of brucellosis. The acceleration of compensation payments is also an important factor to encourage farmer co-operation. All these activities require improvements in the information systems with reinforcement of links between private and official services involved in the campaign. The present legislation covering the small ruminants brucellosis eradication programme, gives rise to many difficulties of interpretation. Adjustments are already necessary in order to clarify procedures and requirements and bring them in line with the reality of the field situation.

Other problems of the region

Sheep and goats movement control is a very important issue in brucellosis control in Serra da Estrela. As stated before, purchases of replacement females were found one of the most important risk of brucellosis. On the 37% of farms that made such purchases there was a five-fold greater risk of the flock developing brucellosis than in self-contained flocks. Purchases from dealers carried greater risks than those from organised markets or direct from other farms. Obviously there is a need to gain greater control over the movement and marketing of stock and the ways in which animals are handled and transported. Improved tagging and recording must be achieved, too, so that sources and destinations of animals may be traced whenever necessary. Again, improved information management will be vital.

Sheep and goat production systems have helped develop marginal areas as Serra da Estrela. They use natural resources that have no other purpose, help to conserve the environment, maintain the traditional culture of the area, and also supply artisanal products that can be of excellent quality and certainly have a place in the national and EU markets. The future role of the processing industry in promoting the quality of these valuable products was studied by Gulbenkian (1993), which concluded that there is scope for developing industrial cheese processing under the supervision of certification authorities controlling cheese quality. The sanitary status of flocks is critical to further development of cheese production because it affects fertility and milk production. Furthermore, through market demand, farmers may be stimulated toward greater protection of their flocks and to invest more effort in brucellosis eradication. They need to be persuaded to relate the quality of products to the sanitary status of flocks, and to explore the possibility of payment differentials according to quality as incentives to accelerate the programme.

Fortunately, progress is being made in the development of small ruminant production as a whole. The trend to co-ordinated milk collection and strengthening of quality standards is leading to rationalisation of production and co-operation between farmers. The result should be an interactive process in which the brucellosis campaign assists in the improvement of the small ruminant industry of Serra da Estrela and this improvement should accelerate brucellosis eradication, thus providing important benefits for human health and welfare.

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