

Risk assessment concerning animal contagious diseases in Norway

In July 2008, the Norwegian Food Safety Authority presented a report on "The future of health management of terrestrial animals in the public and private sector." The report proposes new policies, including the division of responsibility for national animal health work between industry practitioners and the public sector. The report is based upon a number of principles that the European Union are discussing regarding the establishment of new animal health legislation (Community Animal Health Policy - CAHP), which is expected to be completed in 2014. This purpose of this risk assessment is to assist risk managers by being the first step in evaluating which diseases should be the responsibility of the national food authorities and/or the responsibility of industry.

Through the EEA Agreement, Norway is obliged to implement measures in accordance with decisions made in the EU. The diseases that comprise Norway's obligations are not included in the present risk assessment. Individual member countries are able to implement government regulations in areas that are not encompassed by the Community provisions. Areas that are regulated in this way are often referred to as "national actions". The diseases that are subject to such actions have been included in this assessment, as, under certain economic conditions, they can be put under "pressure".

The current risk assessment is essentially, with certain modifications, conducted according to the indications that FAO and OIE have outlined for such risk assessments. It thus includes the following main elements: 1) hazard identification, 2) hazard characterization, 3) exposure assessment, 4) impact assessment, and 5) risk characterization. The final estimated risk is expressed as exposure multiplied by impact.

As zoonotic conditions should be particularly emphasized, more in-depth descriptions and analyses of these conditions have been provided. For the purposes of this document, a zoonosis is defined as a disease or agent that can be transmitted from animals to humans. Several of these diseases can also be transmitted from humans to animals. This analysis is included in Appendix 4 and should be viewed as a supplement to the main part of this risk assessment, and an example of a different and more detailed expert assessment contained within such a risk assessment.

A total of 71 different disease conditions have been considered. Those diseases that are regulated according to EEA / EU legislation and international agreements in relation to the OIE have been excluded as they must be prioritized by public authorities with respect to international obligations, regardless of national considerations. Some other diseases have also been considered, but have been considered to be of such nature that conducting a full risk assessment was deemed unnecessary. In the future national health management of terrestrial animals, it has been assumed that the authorities will be obliged to expend resources to a greater extent on diseases and health conditions that have, or may have, implications regarding general societal harm. The term "societal harm" should be understood to mean an effect that is of general societal interest or importance. Such societal harm might be related to:

- 1) Animal health and welfare, including that of wildlife
- 2) Public health
- 3) Economics

These harmful effects are therefore considered separately, over and above the impact assessment.

The Norwegian Food Safety Authority has specified a number of criteria that should be used as a basis for determining official regulation. These are as follows:
The disease or relevant agent shall:

- 1) Have an unknown occurrence in Norway
- 2) Have a large infectious potential
- 3) Be of zoonotic significance
- 4) Contribute to the development of a national action, with respect to international obligations
- 5) Be of significance to animal welfare
- 6) Have an impact on wildlife populations
- 7) Be surveyed and controlled in accordance with international obligations

Points 1 and 2 are considered in the section on exposure assessment and Points 3 to 6 are considered under impact assessment. Before the assessment was commenced, Point 1 was divided into two parts: 1a) Occurrence in Norway not known, and 1b) Risk of introduction. Points 4 and 7 were removed from the risk assessment itself and replaced with a new point concerned with corporate losses.

Thus, the final list of factors for consideration was as follows:

The disease or relevant agent shall:

- 1a) Have an unknown occurrence in Norway
- 1b) The disease has a high risk of introduction
- 2) Have a large infectious potential
- 3) Be of zoonotic significance
- 4) Be of significance to animal welfare
- 5) Have an impact on wildlife populations
- 6) Be of concern with respect to corporate economic losses

Following completion of the risk characterisation, the exposure assessment and impact assessment were considered for each of these factors. The risk characterization consisted of a short overview of each disease. The risk assessment was conducted such that every individual expert appointed to the *ad hoc* group gave a score, based on a carefully defined scale from 1 to 10, for every point for each disease, with a score of 1 representing the lowest risk and a score of 10 the highest risk, according to the opinion of that individual member. Each individual provided their score for each point completely independently of the other members of the panel. When the scoring had been completed, the scores were entered into a spreadsheet and processed using the @RISK computer programme to create a graphical distribution, and to calculate the mean and distribution of the scores for each point. The results of this

process are illustrated graphically. During this work it became obvious that exposure risk is assessed differently within veterinary medicine compared with human medicine. Thus, in this risk assessment those diseases or agents that do not occur in Norway achieved the highest score (10), while those that do occur in Norway scored the lowest (1).

Since this is a risk assessment, the *ad hoc* group has only ranked diseases according to each individual score point. The *ad hoc* group considers that if the diseases should be classified into groups (e.g. List 1 and List 2), or if there should be a limit set for determining when the government should take responsibility and when industry should assume responsibility, then these aspects should be established within the structure of risk management. Thus, these parameters are not part of this risk assessment. The same applies with respect to whether more emphasis should be placed on zoonotic aspects, or animal health/animal welfare aspects, or potential economic consequences for national or industrial interests. The thrust of such parameters is largely political, and therefore decisions about them rest with those authorities that are responsible for risk management.

When the effects of several factors are summed, in terms of average scores (e.g. for exposure assessment: 1a) the disease does not occur in Norway; 1b) the disease has a high risk of introduction; and, 2) the disease has a high infectivity potential) then the resultant mean scores tend to be similar (that is, variations between scores are reduced). This results in the cumulative score, the mean score, the total score, or the estimated total risk demonstrating less variation between diseases than is found for each individual risk item. This is important to emphasize within risk management should the government wish to prioritize particular impacts (e.g. with respect to zoonoses or operational economic consequences) more than others.

The results of the current risk assessment demonstrate that for exposure (average of the points 1a, 1b and 2), then, according to the *ad hoc* group, the ten most important diseases are as follows, ranked from greatest importance: 1) *Mycoplasma bovis* infection, 2) porcine reproductive and respiratory syndrome (PRRS), 3) porcine transmissible gastroenteritis and porcine epidemic diarrhoea (TGE/PED), 4) *Mycoplasma hyopneumoniae* infection, 5) bovine viral diarrhoea (BVD), 6) jaagsiekte (ovine pulmonary adenocarcinoma; OPA), 7) swine influenza, 8) stonebrood in bees, 9) duck viral enteritis (duck plague), 10) ringworm (*Trichophyton verrucosum*) infection in cattle. It is worth noting that there is no great difference between the different disease risks, but that the risk of introduction is greater for the first five diseases in the list than for the others.

For the impact assessment, compiled for point 3 (zoonotic significance), point 4 (significance to animal welfare), point 5 (impact on wildlife populations), and point 6 (corporate losses), the following diseases were ranked as the top ten most important as follows: 1) salmonellosis, 2) toxoplasmosis, 3) paratuberculosis, 4) orf, 5) canine distemper, 6) swine influenza, 7) glanders, 8) anaplasmosis (tick-borne fever), 9) West Nile fever, 10) leptospirosis. It should be noted that the first three diseases listed had significantly higher impact risk scores than the other diseases in the list. Furthermore, the rest of the diseases listed here (down to leptospirosis), were only slightly higher than the other diseases under consideration, showing relatively little variation between each other in the overall impact assessment. Nevertheless, there were considerable differences between the diseases within each of the impact categories 3 to 6. It is also worth noting that the diseases ranked from 4 to 7 had much lower scores than those above them regarding impact.

It should be noted that diseases such as toxoplasmosis, anaplasmosis and listeriosis had high scores for impact, but low scores for exposure. The reason for this is that the organisms causing these diseases already occur in the environment, or in the water and feed (*Listeria monocytogenes*), or are present in existing vectors (*Anaplasma phagocytophilum*). Thus, these diseases are considered as already introduced and managed accordingly. For several of these diseases, transmission of infection is considered to be more likely to be via the environment or through food/water rather than directly from an infected animal.

Lastly, the risk was assessed as a product of both exposure and impact. In this assessment the following conditions were ranked as highest: 1) salmonellosis, 2) swine influenza, 3) canine distemper, 4) paratuberculosis, 5) BVD, 6) glanders, 7) *Mycoplasma bovis* infection, 8) methicillin-resistant *Staphylococcus aureus* (MRSA) infections, 9) Q fever, 10) American foulbrood. Salmonellosis stands out as being at significantly greater risk than the other diseases. After salmonellosis, the risk drops steadily and rapidly downwards to cattle ringworm. With respect to risk, there are no significant differences between the other diseases. It is important to note that there may, nevertheless, be large differences in impact in some individual areas (e.g. zoonoses or operational economic consequences). This means that selecting those impact areas and diseases that should be prioritized must be decided by policy decisions. The seven diseases with the lowest ranking are associated with a significantly smaller risk than most of the other diseases, and *Mycobacterium avium* infection is ranked as being of significantly lower risk than the other diseases.

With the exception of those diseases that are ranked as being at highest risk, the *ad hoc* group considers that there is little difference between them. This means that prioritization with respect to risk management must be determined in relation to those individual factors that are selected as being of particular focus (e.g. zoonotic aspects, animal health/welfare, or operational economic consequences). It is therefore worth noting that the four most important diseases in relation to animal health and animal welfare are: 1) maedi-visna infection, 2) *Mycoplasma bovis* infection, 3) bovine digital dermatitis (BDD), and 4) contagious foot rot, whilst the most important diseases for wildlife populations are considered to be: 1) paratuberculosis, 2) canine distemper, and 3) anaplasmosis. The most important diseases with respect to operational economic consequences are ranked as being: 1) BDD, 2) BVD, 3) paratuberculosis, and 4) PRRS.

The diseases that had the highest overall scores regarding their public health impact are: 1) toxoplasmosis, 2) enterohaemorrhagic *Escherichia coli* / shiga toxin-producing *Escherichia coli* (EHEC/STEC) infections 3) campylobacteriosis, 4) salmonellosis, 5) MRSA infections, 6) yersiniosis, 7) enteropathogenic *Escherichia coli* (EPEC) infection, 8) listeriosis, 9) West Nile fever, and 10) Q fever. In addition, 15 other diseases were considered to have some significance for public health, while the remainder of the diseases were characterized as having very little or negligible impact on public health. It is worth noting that many of the diseases that were scored highly on the assessment of risk to public health were considered as representing a high risk with respect to their impact, but with a low risk of exposure. This can be explained by the fact that these conditions often have little impact on animal health, or that they are organisms that occur commonly in the animal population or the environment. Thus, exposure to these pathogens can often be addressed as matters of production hygiene, environmental hygiene, or hygiene in relation to production or preparation, and are therefore of relatively less significance to animal health *per se*. Nevertheless, some of these diseases can also cause severe disease in animals (toxoplasmosis and listeriosis).

Finally, the *ad hoc* group would like to comment that in conducting a risk assessment for a total of 71 different diseases, then the assessment must, by necessity, be somewhat superficial in nature. There is little information and experience available for conducting such a broad risk assessment in which the intention is to compare the risk of many different diseases in various animal species. The *ad hoc* group has been concerned with ensuring that all animal species and diseases were considered equally and evaluated on the same scale, and in order to try to ensure this all members of the *ad hoc* group were asked to consider all diseases, regardless of the individual member's particular areas of expertise. In preparing a subsequent work of this nature, it is recommended that a wider panel of independent experts participate, with appropriate representatives from the research environment, industry, and public authorities.

On this basis, the *ad hoc* group also recommends that such an approach is also used to assess the risk associated with different mitigation measures, as an alternative or supplement to a classical risk assessment, and as a foundation for specific risk management.

This assessment has been conducted by Panel 8 (Animal Health and Animal Welfare) of the Norwegian Scientific Committee for Food Safety. The basis for this assessment has been a report that was prepared by an *ad hoc* group appointed by Panel 8. The Panel endorses the conclusions of the report of the *ad hoc* group.