

MEAT AND MEAT PRODUCTS – HAZARDS AND RISK - NORWEGIAN STRATEGIES AND EXPERIENCES*

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A b s t r a c t: In general, Norway benefits from a low incidence rates of most zoonoses. This results mainly from systematic work and collaboration between authorities and private stakeholders for more than 100 years. The approaches have varied dependent of the hazards addressed and the risk they represent. Globalization and free trade challenge established systems. In Norway, the consequences have been delayed by the protection from import fees. Hopefully, we will be able to develop balanced risk based strategies that provide the consumers with thrust in their food supply.

Key words: zoonoses hazards, risk, meat, Norway

Meso i proizvodi od mesa – opasnosti i rizik – strategije i iskustva Norveške

S a d r ž a j: Uopšteno govoreći, Norveška je u prednosti s obzirom na nizak stepen pojavljivanja najčešće prisutnih zoonoza. Ovo je pretežno rezultat sistematskog rada i saradnje između vlasti i privatnih stočara koja se odvija više od sto godina. Pristupi ovom problemu se razlikuju u zavisnosti od vrste rizika sa kojima se suočavamo i mogućih posledica. Može se reći da su globalizacija i izazovi slobodne trgovine uticali na uspostavljanje sistema. U Norveškoj, posledice su odložene zaštitom od uvoznih dažbina. Nadamo se da ćemo uspeti da razvijemo balansiranu strategiju rizika koja će obezbediti poverenje potrošača u snabdevanju hranom.

Ključne reči: zoonoze, opasnosti, rizik, meso, Norveška

Introduction

Food security (enough food) is the most primary need for a human being. The ability to collect and store food was the keystone of the first civilizations on Earth. Grains in Mesopotamia and Egypt, rice in China and corn, squash and beans in Southern America (Diamond, 1997).

The first Norwegian animal health decree was proclaimed in 1732 to protect the country from rinderpest, an epidemic causing ravages to European livestock populations in those days: "Decree, that in Denmark and Norway no kind of Livestock, Meat, Hide, or Hair from Livestock from foreign Places shall be imported; due to Livestock: Illness in Poland".

A law giving powers to ban the import of live animals was passed in 1854 (Sandvik, 1992). The restrictions to import of animal products would have a reducing effect on several zoonoses too, but food safety was not seriously addressed in Norwegian laws until 1860 with the first "Health law". The concept of food safety is rather modern, and has gradually

been developed the latest centuries due to increased scientific knowledge, improved economies and an increased time to worry. Earlier, man was concerned for the food for tomorrow, today the vast majority in Europe is concerned by the foods wholesomeness, palatability, price, etc.

The Codex alimentarius definition of a hazard is "a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect", and furthermore risk is defined as "a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard in food".

In 1892 meat inspection was introduced in Norway, according to the methods of the German scientist Ostertag. In practice, this hazard oriented approximation has been the core strategy up to day. Critics have argued for 30 years that the official meat inspection is targeted at diseases that no longer threaten the Norwegian public health, like tuberculosis and trikinosis, i.e the strategy is not risk based as important pathogens, like *Campylobacter*,

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Salmonella and *Toxoplasma* are ignored by the classical approach alone (Nesbakken *et al*, 1996).

The meat inspection legislation today, based on the EEA/EU-directives, is also based on an os-tertagian philosophy, even though the Hygiene package opens carefully for customization to national risk levels. However, demands to authorization, facilities, labeling, GHP, HACCP, surveillance and control have added important dimensions to improve meat safety. Still meat-borne disease occurs and question is: What is an appropriate response?

In general, Norway benefits from a low incidence rates of most zoonoses (Nesbakken *et al* 1996). The aim of this paper is to give a brief overview of Norwegian experiences and strategies against meat associated hazards and the risk they represent.

Discussion

To obtain safe meat one has to apply preventive measures in many dimensions. Some are given from Nature, some are cultural and others are biologically targeted.

Geography and climate

Geography has been important factor to protect the country from epidemics. The North Sea and Skagerrak have been efficient obstacles for many contagious diseases from the European continent. Also the Baltic Sea has protected both Sweden and Norway, and along the border to Sweden, Finland and Russia, it is mainly woods, mountains or arctic conditions with low density of both animals and humans.

Climate has also been important for some diseases like vector-borne infections and some parasitic infections. However, the cold climate is in general not regarded that important for most bacterial zoonoses. Febris undulans (*Brucella mellitensis*) is an exception, and yersinosis (*Yersinia enterocolitica*) may be an example that seems to occur more frequent in cold climates.

Infrastructure and organization

Infrastructure and organization are results of history and culture. The Scandinavian countries have benefited from relative stable political conditions. Norwegians thrust their authorities and the agricultural private sector is thoroughly organized and regulated. The basic idea is that food safety and contagious diseases are not a national competitive element and that the control measures should be made and financed to a large extent in common. However, a sound livestock is a very important competitive advantage for export of genes and live animals.

The Norwegian combats of diseases have benefited from collaboration between the authorities and private stakeholders. The trend of private responsibility for food safety and animal health standards may undermine the situation in the future, if the farmers' organizations and the industry are not able to coordinate or finance common actions and obtain confidence among the producers and companies.

Norwegian Food Authority has become considerably consumer oriented in few years. Then expensive Utopian demands, like zero-risk level, sometimes replace balanced risk management. The paradox is that unrealistic demands may out-compete national production that has achieved a very high level, for imports from countries in a less favourable epidemiological situation.

Norwegian herds have traditionally been small, but are now increasing significantly. Herd size has been regarded an important factor for prevalence of infectious diseases. Infections depend on infective and a critical number of susceptible individuals. If the group size is below a critical number, the infection will burn out (endemic fade-out) (Anderson *et al*, 1991). The effect of increased herd size on zoonotic incidences in Norway remains to be documented.

Feed control

The importance of animal feed has been terribly underlined the last decades by serious food scandals in Europe. Chemical contamination from e.g. dioxins and cadmium has raised great concern about the European food chain. The BSE and vCJD, caused by a transmissible protein, has not directly affected Norway. No cases of BSE or vCJD have been detected in spite of substantial testing according to the EU schemes. Status is due to decisions made by a former chief veterinary officer, Olav Sandvik, who banned the use of bone meal originating from the same species and the fat extraction method applied from the 80'ies, e.g. in Britain. The decisions were based on the precautionary principle that here could be simplified to "cannibalism is dangerous" and that it is important to apply measures that break cycles of transmissible agents. Norway is still the only country in the lowest risk group in Western Europe (Hogasen *et al*, 2007; Skjerve *et al*, 1996).

A pandemic like salmonellosis due to *S. Enteritidis* in layer hens has not established in Norway. This is probably due to strictly organised egg production systems and control regimes for concentrate feed. Also, infections due to *S. Typhimurium* and other serovars are seldom acquired from domestic animals and products thereof. The most likely preventive factor is again control regimes of concentrate feed. A significant proportion of protein feed is imported

and different salmonella serovars are isolated regularly from raw feed. The concentrate feed undergoes mandatory heat treatment and the positive effect on feed hygiene seems obvious.

Control measures on farm and in industry

Import restrictions of livestock and animal product have been the rule of thumb since 1732 to 1995. Norway has for centuries been dependant of import calories, i.e. grains. After the 2nd World War the policy has been 50 % self supply. However, animal food products, like milk and meat, have been protected by law and import duties. In 1995, The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) ended the ban of import principle: "Reaffirming that no Member should be prevented from adopting or enforcing measures necessary to protect human, animal or plant life or health, subject to the requirement that these measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between Members where the same conditions prevail or a disguised restriction on international trade." Since then, the protection of Norwegian animal production is heavily dependent on import duties. Additionally, documentation that the prevailing conditions are favourable in Norway has been important for improved protection of the animal health and zoonosis situation. However, this is regarded to be a more labile situation.

Eradication programmes has been applied from late 1890'ies in Norway for anthrax, bovine tuberculosis and brucellosis. Fowl typhoid (*S. Gallinarium*) in hens was actually eradicated twice, before and after the 2nd World War. This most radical strategy has been successful many times. The campaigns have not always been subject to cost-benefit analyses.

The pasteurization was introduced for milk in the 1920's in Norway. The original objective was

References

- Diamond, J. M., 1997.** Guns, germs and steel: a short history of everybody for the last 13,000 years. W.W. Norton & Co, New York;
- Sandvik, O., 1992.** Animal Health Standards in Norway. The Royal Ministry of Agriculture. Norway;
- Nesbakken, T., Skjerve, E., 1996.** Interruption of microbial cycles in farm animals from farm to table. Meat Science 43 (No. S), S47-S57;
- Anderson, R. M., May, R. M., 1991.** Infectious diseases of humans Dynamics and control. Oxford University Press, UK;
- Hogasen, H. R., de Koeijer A. A., 2007.** Quantitative risk assessment for bovine spongiform encephalopathy in low- or zero-prevalence countries: the example of Norway. Risk Anal., 27,5,1105-17;
- Skjerve, E., Gronstol, H., Rimstad, E., Sandvik, O., 1996.** Matvarekvalitet, dyrehelse, og internasjonal handel:

again to prevent animal disease like brucellosis, foot and mouth disease, etc. A by effect was a tremendous reduction on human diseases like scarlatina (*Strept. pyogenes*). Paradoxially, steam pasteurization of carcasses has not been allowed. The authorities argue that it may reduce the focus on general hygiene in the industry. A serious EHEC-outbreak (*Schimmer et al*, 2008) has challenged this policy, and it is likely that steam cabinets will be allowed in the future.

Surveillance and control have become the modern response to zoonoses like salmonellosis. Test positives on farm without clinical signs are challenging. Should the zoonotic agents or the zoonoses be targeted? Bacteriological samples have specificity close to 100 %, but their sensitivity may be low, which means false negatives is easily missed. A serological test may both have quite good sensitivity and specificity, but high numbers of screened individuals tend to cause a serious number of false positives as well. The surveillance systems introduced with the EEA agreement from 1994 have gained some knowledge of prevalence of many infectious agents, but it is not obvious that they have reduced efficiently the human burden of corresponding diseases (*Sandberg et al*, 2002). On the other hand, the documented reduction of human incidence rates for yersinosis is most likely a result of "bagging", a simple improvement of dressing procedures of pork carcasses applied in Norway (*Nesbakken et al*, 1994).

Conclusions

Future protection of meat safety will depend on several preventive measures along the value chain from farm to table. Hopefully, private and governmental bodies will be able to collaborate and coordinate balanced risk based strategies that provide the consumers with thrust in their food supply.

risikoforbundet med økt import av levende dyr, kjøtt og andre dyreprodukter fra EØS-området og andre land. Nor.Vet.Tidskr. 108(6B);

- Schimmer, B., Nygard, K., Eriksen, H. M., Lassen, J., Lindstedt, B. A., Brandal, L. T., 2008.** Outbreak of haemolytic uraemic syndrome in Norway caused by stx2-positive *Escherichia coli* O103:H25 traced to cured mutton sausages. BMC.Infect.Dis. 8, 41;
- Sandberg Marianne, Hopp, P., Jarp, J., Skjerve, E., 2002.** An evaluation of the Norwegian Salmonella surveillance and control program in live pig and pork. International Journal of Food Microbiology. 72, 1-2,1-11;
- Nesbakken T, Nerbrink E, Rotterud OJ, Borch E. 1994.** Reduction of *Yersinia enterocolitica* and *Listeria* spp. on pig carcasses by enclosure of the rectum during slaughter. Int.J.Food Microbiol.23, 2,197-208.