

## EPIDEMIOLOGY AND QUALITY ASSURANCE : APPLICATIONS AT THE FARM LEVEL

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*La production animale est importante en ce qui concerne l'économie de l'élevage et la position du secteur, mais aussi la qualité et la sécurité des produits, la santé publique. La production animale forme partie d'une chaîne de production alimentaire. C'est pour cela que les éleveurs doivent se rendre compte des demandes des consommateurs sur le plan de la santé animale, du bien-être et de l'environnement. On doit adopter une autre attitude, connue du code GFP. En plus, ils auront besoin d'un système de support pour la gestion de risques de qualité. Généralement, il y a 3 méthodes : GFP, HACCP et ISO-9000. L'hypothèse est que la santé forme, exactement comme le bien-être et l'environnement, un attribut de qualité de production animale. HACCP serait bien apte pour la gestion de risques, liées à l'introduction et la dispersion des infections dans les élevages, parce que des méthodes d'épidémiologie peuvent identifier ces risques et quantifier les contributions aux maladies. Le réseau des Points de Contrôle Critiques dans l'élevage est le plus important outil pour ce but. Les principes d'application seront illustrées. Il est probable que pour les domaines du bien-être et de l'environnement, HACCP et ISO peuvent devenir importants également.*

### INTRODUCTION

Livestock production has relevance with regard to farm productivity and farm income, national product and export position, but also to product quality and safety expressed in public health, and to a variety of consumer demands ranging from animal welfare and production methods to environmental issues. The Livestock production is highly consumer driven, especially in areas with rather intensive production systems. This has been one reason for designing Integrated Food Chain Quality Assurance programs for eg. Pigs and poultry.

A livestock farmer participating in such programs has to focus more on quality issues than on production volume and economics alone in order to meet with customer and consumer demands. This requires a change in attitude and farming style in many farmers and at the same time there is a need for simple but thorough methods to manage the control of quality on the farm. This is shown with the example of animal health care.

### ANIMAL HEALTH CARE

Veterinary medicine has changed focus from a curative to a more balanced preventive one, and from the individual to the herd. This is valuable because disease can result in considerable economic losses and a diseased animal may be the signal for a deviating management of the herd. Next to the establishment of vaccination programs, there is a growing tendency towards a veterinary consultancy type of medicine focusing on herd health and production management support (Brand et al., 1996). Many of these programs show retrospective data analysis features, meaning that causes of deviations are searched after problems have been detected. In such support programs, epidemiological methods can be applied to identify determinants of health and disease on the farms and to quantify their contribution. Priorities can be set that way to eliminate or at least reduce the risk conditions on a farm, and hence reduce the disease occurrence. The latter approach is already more focused on disease prevention instead of on disease control (Noordhuizen et al., 1992).

Given the fact that the health status of animals have an impact on subsequent quality of animals and their products, it could be hypothesized that health can be regarded a quality issue and health care can be executed by applying quality management.

### QUALITY AND QUALITY CONCEPTS

Definitions and dimensions of quality have been given by Evans & Lindsay (1966) and Garvin (1984). In short, quality can be defined as the totality of features and characteristics of a product or service that bears on its abilities to satisfy given needs. Customer and consumer demands have to be translated into product and process specifications, that technical and managerial activities should be coupled to the customer demands, and that these are the driving force behind (farm) production. The farmers should be more aware of the markets they are producing for and of the respective segments of the consumer population. In Integrated Food Chains, the meat pig farmer is for example the customer of the multiplier, the slaughterhouse the customer of the meat pig farmer ; all of them have to focus on the consumer as well. Farmers have to produce according to a total quality management concept, because in addition to

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animal health other farming areas enter the picture of quality assurance, such as welfare issues and environmental issues. Under the umbrella of total quality management, different concepts can be distinguished : Good Farming Practice codes (GFP), Hazard analysis critical control points (HACCP), ISO-9000 series (Juran, 1989). For the application of quality management to animal health care, Noordhuizen & Welpelo (1966) pointed to HACCP as first choice at this moment, in comparison to GFP or ISO-9000. Main reasons were : process focus and through that a product orientation ; simplicity ; self-management through a network of on-farm control points ; health status demonstrable for certification and insurance ; corrective action foreseen ; few documentation : low labour input ; high expected benefits/costs ; functional link with integrated Food Chains feasible. In general the choice of the method depends on objectives set, farming conditions prevailing, farm management quality level and attitude.

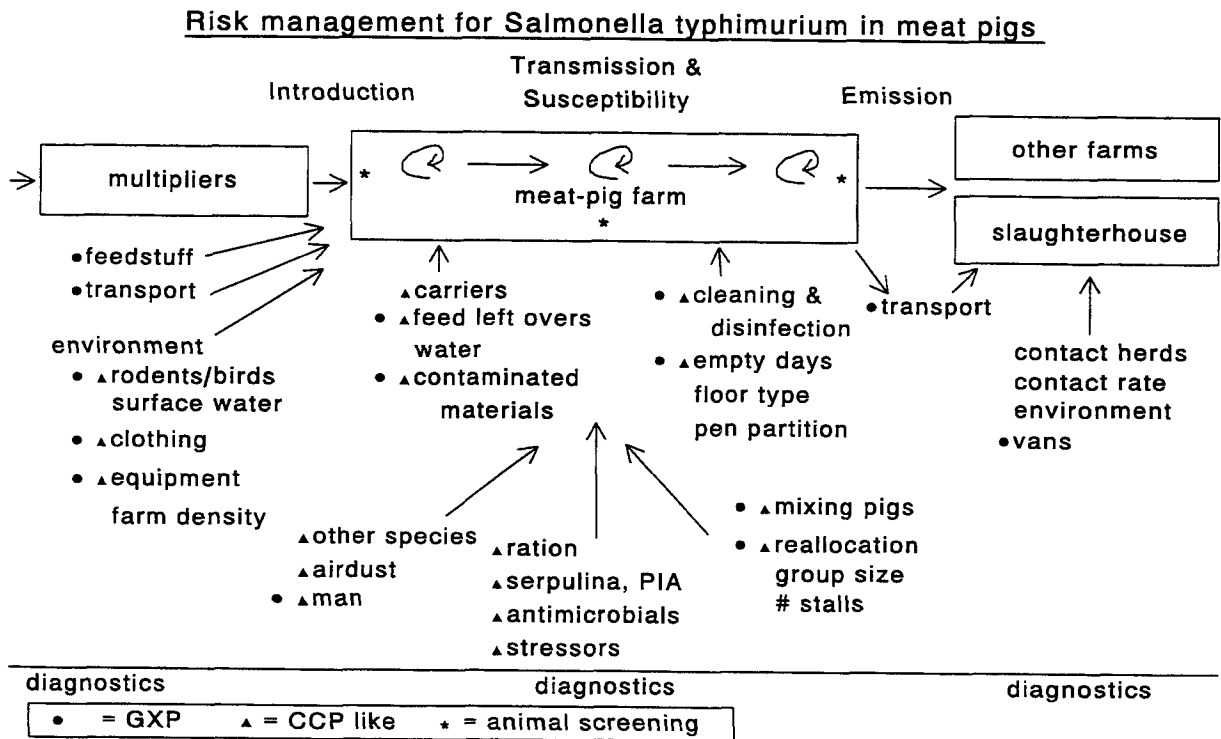
Commonly, a GFP code adoption precedes the further adoption of HACCP or ISO-9000.

**HACCP AND ANIMAL HEALTH CARE**

Originally, HACCP was designed for the systematic approach of microbiological hazards associated with foodstuffs. Currently it is widely adopted and approved as by FDA/USDA and European Union. It is however not extensively introduced in animal production. Major elements of HACCP regard the identification of hazards, the identification of risks associated with these hazards, the identification of critical control points (CCP) and the design of an on-farm monitoring network of CCPs. A CCP is a process step/condition or measuring point which is paramount for the elimination or reduction of a hazard to an acceptable level. CCP is associated with the hazard (eg infection), it must be measurable, control measures should lead to reduction of risks, corrective actions should lead to restoration of lost control. Each CCP has tolerance levels and standards. The cleaning water temperature can be set at 80°C standard with a tolerance of plus and minus 3°C. Cows newly introduced into the herd should be free of certain pathogens (eg *Salmonella spp*) ; a tolerance level is zero. If manure is a risk for introducing salmonella bacteria into a dairy herd, it should be checked and if positive it should be refused or « corrected » by spreading it over the pasture and leave it there without grazing for 6-8 weeks.

An example of applying HACCP principles to animal health care at a meat pig farm (see figure 1) and at a dairy farm will be given during the presentation. They will soon appear in print (Noordhuizen et al., 1997).

**Figure 1**  
**Example of HACCP application on a meat pig farm :**  
**Risk management for *S. typhimurium* introduction and spread**



## GENERAL DISCUSSION AND CONCLUSIONS

In the preceding paragraphs a concept of applying quality management to animal health care has been addressed. Within the context of HACCP it was shown that there is a strong relationship between quantitative epidemiology (risk analysis) and quality risk management (risk assessment and risk management). In such a way disease prevention may become risk prevention, and disease control becomes risk management. One of the current drawbacks is that for many diseases a quantitative risk assessment has not been done yet. An intermediate replacement for observational field studies could be Adaptive Conjoint Analysis such as has been carried out for *S. dublin* infections in dairy (Shouten et al., 1997 submitted), although it appears that this method can not fully replace the field studies.

Quality is a true issue in society but also in agriculture. Retailers demand to know the origin of their animal products or slaughter animals to be more sure about risks. Some farms are certified by ISO-9002 such as in Germany, while other farms are certified for environmental issues through BS 7750 or ISO-14001 such as in Denmark (Gottlieb-Peterson, 1997). This process will continue, because also for welfare issues it will be necessary that farmers can prove what they do. Ultimately, such proof will go beyond the availability of a document stating the way how to run a farm process or function, or stating how things should or would have been done. Customers and consumers will require the proof of what exactly has been done to eliminate or reduce risks. Not in the least this will be required by insurance companies when dealing with ways to cover the risk of disease calamities at the farm level. The fact that HACCP and ISO-9000 are highly compatible (Bredahl & Holleran, 1997) could mean that in the Integrated Food Chains one may strive for a streamlining of certification over time, identifying different phases and ending up in ISO or Total Quality Management.

Livestock farmers, standing at the beginning of the chains, are at a relatively long distance from the consumer. Nevertheless, if he desires to maintain market access and to meet with consumer demands, he has to change from a conventional farming practice to a quality oriented management. The first step could be through adopting and applying GFP, the next step through HACCP. The latter is particularly valuable for farm operations already participating in veterinary herd health and production management programs.

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