

## ORAL PRESENTATIONS

### RISK ASSESSMENT CHALLENGES IN THE FIELD OF ANIMAL WELFARE

**Candiani D., Ribò O., Afonso A., Aiassa E., Correia S.,  
De Massis F., Pujols J. and Serratosa J.**

*Animal Health and Welfare (AHAW) Unit, European Food Safety Authority (EFSA),  
Largo N. Palli, 5/A, 43100 Parma, Italy.*

#### SUMMARY

EFSA provides scientific advice regarding risks associated with food by using the Risk Assessment (RA) approach. The AHAW Panel of EFSA provides advice on risk factors related to animal diseases and welfare. The EFSA Scientific Colloquium on Food Producing Animals (2005) concluded that no standard methodology on RA for Animal Welfare (AW) exist yet. This paper presents the different RA approaches developed by EFSA, when assessing the risks associated with AW, from the Calves' Welfare Scientific Opinion until the current approaches on Pig and Fish welfare. These constitute the basis for the future standardization of a RA methodology for AW.

**Keywords:** animal welfare, risk assessment, hazard identification, hazard characterisation, exposure assessment, risk characterisation, food producing animals.

#### INTRODUCTION AND OBJECTIVES

The mission of the European Food Safety Authority (EFSA) is to provide scientific and technical advice for the Community's legislation and policies in all fields which have a direct or indirect impact on food and feed safety, including animal health and welfare (<http://www.efsa.europa.eu>). The Animal Health and Animal Welfare (AHAW) Panel of EFSA provides advice on specific risk factors related to animal diseases and welfare of food producing animals, including fish.

EFSA provides independent assessment on all matters within its remit by using a Risk Assessment (RA) approach. RA is the process of evaluating the likelihood and severity of an adverse event occurring to humans, animals or to the environment following exposure under defined conditions to a specific hazard. Guidelines for the conduct of RA have been developed to assess the risk of animal disease import (OIE, 2004a and b) and the risk of microbiological hazards in food (Codex Alimentarius, 1999).

In order to discuss the state of the art regarding the RA in food producing animals, a Scientific Colloquium was organized by EFSA on December 2005 and held in Parma (EFSA, 2006c). One of the main conclusions from the colloquium was that no specific standardized RA methodology exists in the field of the Animal Welfare (AW) and that it would be worthwhile to set up a working group to further investigate on these methodologies.

The main difficulty in AW seems to be the clear description of adverse effects and distinction from causal hazards which are crucial for the characterisation of the risk. In addition, it has to be taken into consideration that hazards and adverse events may be different depending on species, breed, age, physiological status and production system.

Since 2004, the Animal Health and Animal Welfare (AHAW) Panel adopted several Scientific Opinions on AW dealing, among others, with laboratory animals, stunning and killing methods, piglet castration and animal transport. In 2006, two Scientific Opinions on the welfare of intensively kept calves (EFSA, 2006a) and the health and welfare risks of the import of captive birds inside EU (EFSA, 2006b) were adopted. A new approach on the RA methodology was tentatively initiated. At present, new scientific opinions dealing with pig welfare, fish welfare and dairy cows' welfare are under development where this RA approach on animal welfare is being improved.

The aim of this paper is to present the different approaches developed by EFSA's Working Groups, when assessing the risks associated with AW in food producing animals, starting from the Calves' Welfare Scientific Opinion (EFSA, 2006a) until the current ongoing scientific opinions on Pig and Fish welfare.

## METHODS AND RESULTS

As previously referred no specific methodology exists for the development of the RA in AW. Therefore, both OIE and Codex methodologies were adapted to the AW field in order to develop a step by step scientific RA. The first RA approach was attempted in the Scientific Opinion on Calves' Welfare (EFSA, 2006a). The second approach on the health and welfare risk of the import of captive birds solved some of the gaps from the previous Calves RA approach. Finally, the ongoing risk assessments on pig and fish welfare improve the first attempt on developing a RA approach on AW. The different steps followed on the development of the different scientific opinions are explained:

### *1. Hazard identification*

Hazard is defined as a production factor affecting AW while the risk is a function of the probability of a negative effect on the animals and the severity of that effect (adapted from OIE, 2004a). Hazard identification consists in the recognition of the biological, chemical and physical agents able of causing adverse effects on AW (adapted from WHO, 1999). The first step for achieving hazard identification was to identify the animal's needs. Such animal needs, which must be fulfilled at farm level (e.g. need to obtain resources, receive stimuli or express particular behaviours) were related to one of the three main sources of risk: nutrition, housing and management. This allowed identifying the production factors which constitute the hazards. Examples of needs, related hazards and adverse effects on the animals are reported in Table 1. This first step was commonly followed on the different AW scientific opinions (calves, captive birds, pig and fish welfare).

**Table 1.** Examples of hazards related to animal needs with related adverse effects

Need	Hazards	Adverse effect
<b>Nutrition:</b> to drink, to thermoregulate,...	<ul style="list-style-type: none"> <li>• <u>Difficult access to water</u></li> <li>• <u>Insufficient feed</u></li> <li>• <u>Too low milk T°</u></li> <li>• ---</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Thirst</u></li> <li>• <u>Hunger</u></li> <li>• <u>Stress, anxiety</u></li> <li>• ---</li> </ul>
<b>Housing:</b> to rest, to exercise,...	<ul style="list-style-type: none"> <li>• <u>Sliding floors</u></li> <li>• <u>Inappropriate ventilation</u></li> <li>• ---</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Lameness</u></li> <li>• <u>Pain, malaise</u></li> <li>• ---</li> </ul>
<b>Management:</b> To avoid fear, to have proper social interactions,...	<ul style="list-style-type: none"> <li>• <u>Staff without experience</u></li> <li>• <u>Mixing of unfamiliar animals</u></li> <li>• ---</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Stereotypes</u></li> <li>• <u>Fear</u></li> <li>• <u>Stress</u></li> <li>• ---</li> </ul>

## *2. Hazard characterisation*

Hazard characterisation is the qualitative and/or quantitative evaluation of the nature of the adverse effects associated with the hazard (adapted from WHO, 1999). In the scientific opinion on Calf Welfare, the impact of the various hazards on the individual animal was evaluated and referred to as slight, adverse, moderate, serious and very serious according to the severity of the hazard effect on the animal.

During the development of the scientific opinion on Captive birds (EFSA, 2006b), the effect on the individual animal was correlated to the duration of the hazard: it was therefore introduced the duration parameter. The difference in the hazard characterisation estimation between the Calf and the Captive birds' scientific opinions is presented on Table 2.

The ongoing RA on the welfare aspects of different husbandry systems for farmed pig and for farmed fish introduce the parameter of hazard magnitude, including both duration (relative to the whole animal life time) and severity (from negligible to critical) of the adverse effect, and the parameter of likelihood of the occurring of the adverse effect (Table 3).

Severity has been divided in critical (when it is fatal); severe (explicit pain, malaise, fear or frustration may occur); moderate (some pain, stress, fear or anxiety reactions); limited (minor pain and malaise) and negligible (no pain, fear or frustration occur).

The uncertainty of the scientific evidence on the likelihood was also introduced in respect to the principle of transparency. Uncertainty is low when solid and complete data are available (peer-review published data); medium when no complete data are available or authors' conclusions vary from one to other; and high when scarce or no data are available or for rather evidence provided in unpublished reports (Table 3).

**Table 2.** Hazard characterisation in the Calves and the Captive birds' scientific opinions

Calf Welfare	Captive Birds	
	Hazard characterisation	
Hazard characterisation	Severity	Duration
Very Serious	Critical	Short (0.5 h)
Serious	Severe	Medium (12 h)
Moderate	Moderate	Long (24–48 h)
Adverse	Limited	Very long (> 48 h)
Slight	Negligible	

**Table 3.** Hazard Characterisation – Pig Welfare and Fish Welfare

<b>Hazard characterisation</b>					
<b>Hazard description</b>	<b>Adverse effect description</b>	<b>Magnitude</b>		<b>Likelihood</b>	<b>Uncertainty</b>
		<b>severity</b>	<b>Duration</b>		
		Critical	0–100%	High	Low
		Severe		Moderately high	Medium
		Moderate		Moderately low	High
		Limited		Low	
		Negligible		Negligible	

### ***3. Exposure assessment***

Exposure assessment is the qualitative and/or quantitative evaluation of the exposure to the production factors which may cause an adverse effect (adapted from WHO, 1999). In the Calves' Welfare and Captive birds' RA approaches, the exposure to the hazard was determined in terms of likelihood and intensity of the exposure from the animal.

The parameters of duration and uncertainty, relative to the exposure assessment, were also introduced in the Pig Welfare and Farmed fish Welfare RA approaches, as shown in Table 4.

**Table 4.** Exposure Assessment – Pig Welfare and Fish Welfare

<b>Exposure assessment</b>			
<b>Intensity</b>	<b>Duration</b>	<b>Likelihood</b>	<b>Uncertainty</b>
Critical	0–100%	High	
Severe		Moderately high	Low
Moderate		Moderately low	Medium
Limited		Low	High
Negligible		Negligible	

### ***4. Risk characterisation***

Risk characterisation is the estimation of the probability of occurrence and severity of the adverse effects in a given population following the exposure to a specific hazard (adapted from WHO, 1999). Risk characterisation gives the risk managers information on the specific situation of the animal in relation to its basic needs. In the Calf Welfare and Captive birds (EFSA, 2006 a, b) scientific opinions, the overall risk on animal welfare was estimated by integrating the hazard characterisation and the exposure assessment into risk estimations (major, minor or negligible risk; Table 5). A similar approach, including the evaluation of the severity/intensity and the duration in both hazard characterisation and exposure assessment, will be followed for the risk estimation of the Pig and Fish Welfare Scientific Opinions.

**Table 5.** Risk characterisation – Calf Welfare and Captive Birds’ scientific opinions, 2006

Risk characterisation		Exposure assessment				
Hazard characterisation		Very rare	Rare	Moderately frequent	Frequent	Very frequent
	Slight adverse effect	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Negligible risk
	Adverse effect	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Minor risk
	Moderately serious	Negligible risk	Negligible risk	Minor risk	Minor risk	Minor risk
	Serious	Negligible risk	Negligible risk	Minor risk	Minor risk	Minor risk
	Very serious	Negligible risk	Minor risk	Minor risk	Minor risk	Major risk

## CONCLUSIONS

The RA process has several benefits. The major advantage is transparency as scientific evidence is provided through the data used, the risk pathways and assumptions are defined and the RA approach is described. RA can support the prioritization of areas for intervention (risk management) and give information on further data needs (recommendations for future research).

As previously described, different RA approaches have been followed for the development of the scientific opinions in the field of AW. The Scientific Colloquium of 2005 concluded that a standardized methodology for RA in AW does not exist at the moment. As a consequence, EFSA is launching a self-mandate on the establishment of general guidelines and working methodology for RA in AW issues. The work has already started with the set up of the necessary basic information, which includes the definition of the scientifically justified main issues to be considered and a list of key researchers and centres of excellence working in AW and RA related with AW (at EU and not EU level).

The next step for the development of the RA Guidelines in AW will be the set up of different Working Groups, in relation to the main animal species and AW issues to be considered.

## REFERENCES

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