

# **Cow Comfort and Cattle Welfare**

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## **Abstract**

Animal welfare concepts are various, but the commonly known is based on the Five Freedoms. For practical application these freedoms are too vague. Therefore, the biological needs concept has been derived from these five freedoms. The twelve biological needs can be translated into practical parameters. Cow comfort represents the combination of such parameters in the areas of feed & feeding, barn & barn climatic conditions, housing conditions, and specific behavioural aspects. Basically they represent potential risk areas that contribute negatively or positively to the well-being, behaviour, health, production and reproduction of cattle. In this paper the forenamed issues are addressed. Examples will be provided during the presentation.

## **Introduction**

Animal welfare has become an important issue in European livestock farming, in EU politics and in society. Concerns in the general public largely originate from the perception of the intensive (industrial) livestock production and from different outbreaks of some highly contagious diseases in the last decades like foot-and-mouth-disease, avian influenza and classical swine fever, and the massive eradication campaigns following these outbreaks. The role of the media in the perception of the general public is a dominant one. Consumer protection is a major issue in the EU politics; in several directives and regulations (e.g. 178-2002) this also comprises the issue of animal welfare, for example during animal transportation for trade reasons. Although the physical distance between livestock farming and urbanized areas is narrowing rapidly, the gap in knowledge about farming procedures and animal husbandry in the civilian is increasing. The general public has a certain opinion about animal husbandry, right or wrong. In food chain quality assurance systems comprising livestock production, animal welfare is included as one of four main issues next to food safety, public health, and animal health. This implies that also the dairy farmer has an important role in providing the animals with the proper environmental and managerial conditions for optimal wellness and, hence, optimal health and productivity.

This paper addresses dairy cattle welfare from the perspective of cow comfort on the dairy farm. In the context of cow comfort, focus will be on four predominant clusters: barn climate, housing conditions, feeding management, and behaviour. It is discussed what the dairy farmer can do to optimize cow comfort and hence health and productivity, and which role the veterinarian can play to support him in that process. During the presentation several field examples will be given as illustration.

## **Animal welfare**

Animal welfare has been extensively addressed in literature. Different approaches have been followed: from basic neurobiological and neuro-endocrine approaches (Dantzer & Mormède, 1983; Dantzer, 2002) to that of the balance between

satisfaction status and stress responses, and to that of adapting the environment to the animal's performance. A synthesis of these approaches is presented in Fig. 1. The most frequently referred model, in which the animal is pivotal for defining welfare, is the concept of the *Five Freedoms* (Webster, 2001). These five freedoms refer to the freedom of hunger and thirst; diseases, pain and lesions; physical and physiological discomfort; fear, distress and chronic stress; limitations in conducting species-bound behaviour.

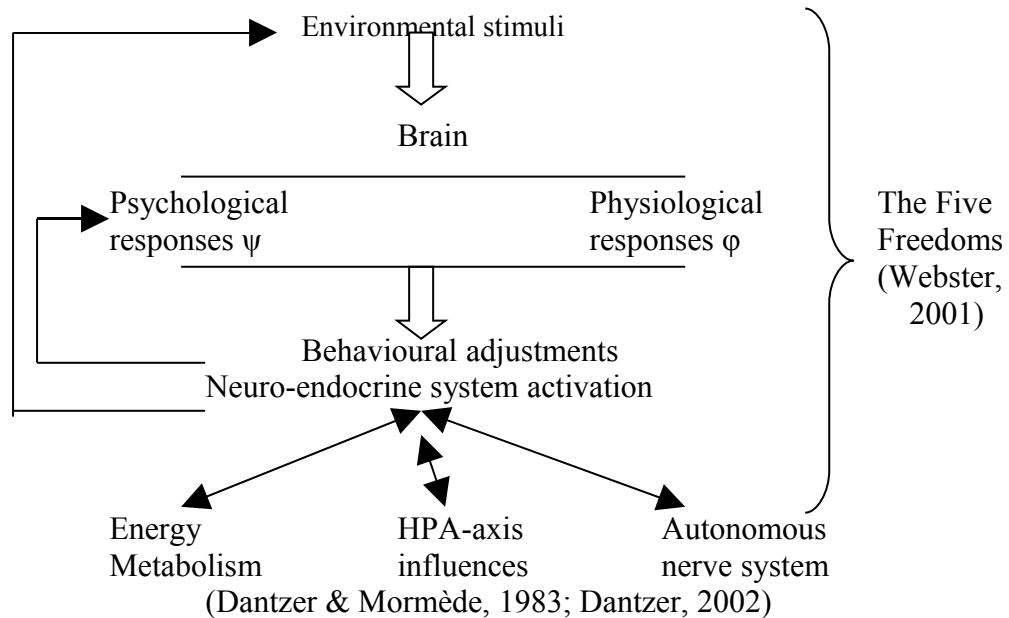


Fig. 1. Synthesis of animal welfare concepts and pathways.

Because these five freedoms are rather vague for facilitating application in the field, these have been translated into *biological needs* (Bracke et al., 2001). These authors have defined 7 primary and 5 secondary biological needs (Table 1).

Primary biological needs	Secondary biological needs
Feed and feed-related behaviour	Excretion (faeces and urine)
Water and drinking-related behaviour	Thermoregulation
Resting, lying and standing	Exploration and orientation
Locomotion (and claw/leg disorders)	Grooming, comfort behaviour
Social comfort (interactions)	Reproduction and rearing
Health status	
Safety (fear, flight behaviour, aggression)	

Table 1. Listing of primary and secondary biological needs (Bracke et al., 2001)

When we assign parameters to these clusters of biological needs, we will end up with about 100 different parameters describing the 7 primary biological needs (Lievart et al., 2005, unpublished). The art is now in translating these biological needs into practical parameters which can be addressed and preferably scored in the field. The ultimate example of this exercise is in the concept of *cow comfort*.

## Cow comfort

Cow comfort is the adequate combination of such elements in the immediate cow's environment which jointly contribute to the cow's wellness, behaviour, health, reproduction and productivity. Cow discomfort is the outcome of the combination of risk conditions in the forenamed elements.

There are 4 major clusters in cow comfort: [1] Barn and barn climatic conditions, [2] Housing conditions, [3] Feed and feeding associated issues, [4] Specific behaviour. These clusters and their respective elements will be addressed in more detail below.

- Barn and barn climatic conditions

First of all the long barn sidewall should be directed against the predominant south-west wind; the sidewalls should be completely open while the cows should be protected against heavy cold winds by mobile, light-coloured curtains. When several barns are present, the distance between barns must be more than 30 m to allow adequate air movements. The barn should provide sufficient m<sup>3</sup> for the cows. The air-movement at cow-level should be less than 5 m/sec. This is because the thermoneutral zone of cows is between -5°C and +20°C and their thermo-indifference between +5 and +15°C, contrary to that of man which is much higher (Schrama et al., 1996). Through this improved ventilation and air movement the total bacteria load of barn air could be less than 150.000/m<sup>3</sup>, while the moist originating from cow's sweat (25 lt/cow/day) is easily removed (Banhazi et al., 2004). Relative humidity in the barn should not exceed 80%. Moreover, if the farmer cleans regularly the floors from manure/urine, these floors will be much dryer which enable cows to walk unhampered. Light in the barn should be more than 100 lux for achieving optimal cow activity and optimal cow observation. This light level can be achieved by using halogen lighting. As a rule of thumb, one should be able to read a newspaper in the barn.

- Housing conditions

The alleys in e.g. a loose housing system should be sufficiently wide to allow for easy and rapid cow traffic, e.g. 3 to 4 m. The total walking or waiting area surface for cows should allow an inter-cow distance of 2 to 5 m, comparable to that in pasture. The feed rack should preferably not be a fixation feed rack for optimal access to feed and rapid in/out movements in case of dominant vs subordinate confrontations. A sufficient number of feeding places must be provided given the number of cows present. The cubicles, if any, should have the appropriate size for the breed prevalent; this can be observed by the cow's udder and tail lying inside the cubicle. The basis of the cubicle should have a downward slope of 5 cm to remove moist. Bedding material must be deep-litter (> 15 cm) or sand, soft and dry to induce cleanness and dryness of cows. The *knee-test* by man will show whether or not the demands are met. Deep-litter cubicles should be upgraded daily with at least 1 kg straw of 2—3 cm length (plastic, isolation) or 12 kg sand (plastic, cool, rough on floor) per cubicle. When more rows of cubicles have been installed parallel in the barn, then the distance between the cubicle fronts should be at least 1 m to allow cows easy standing up. Brisket boards should be adjusted

at 170 cm from the back of the cubicle, a neck-rail at 165 cm +/- 5 cm from the back of the cubicle and at 110 –120 cm height above the bedding. Drinking water troughs must be easily accessible and be protected from freezing. The flooring in exercise areas like in the alleys and waiting area should be clean and dry, and possibly coursed but preferably rubber topped for optimal cow activity, cow's oestrus expression, claw health and cows' interactions. Floor maintenance means screening for unequal slats, loose slats and their repair. Optimal locomotion of cows as detectable by the locomotion score, step length, oestrus behaviour, and claw health and peri-arthritis cases should be achieved. Most of the claw lesions show in their risk factor profile the relevance of floor quality, locomotion, non-hygienic floor conditions, social stress (Somers et al., 2003; Bergsten, 2004).

The milking parlour must be easily and rapidly accessible for cows, have full light and be equipped with additional technology like automatic cluster detachment, teat spraying devices, large milking claw volumes for both rapid milk removal and prevention of teats being washed in (contaminated) milk. In automatic milking systems, specific adaptations must be provided (Ketelaar-de Lauwere et al. 1999). If possible, a dynamically movable floor is installed to improve milkers' labour and well-being.

In hot climatic conditions, where heat stress may occur, large ventilators well positioned in the barn should be installed, while an internal and or external sprinkler installation is advisable. In pasture, shady places should be available during hot conditions, for example trees.

Separate calving pens and sick cow pens should allow visual contact with the herd mates. They should have more than sufficient space for each cow. Cleaning and disinfection should be carried out before each new animal

- Feed and feeding management

High yielding cows show feeding frequencies up to 12 times per day. Feed should therefore be available all day. The feed bunk must be smooth, clean and dry; daily cleaning must be performed to increase feed intake. The feed bunk floor must be 10 cm higher than the floor cows are standing to optimize feed intake and prevent front claw lesions. Feed in the feed bunk should be pushed up to the cows regularly. Feed left-overs should be weighted per group and diverted in the average per cow to detect trends. The feed rack should easily accessible, preferably not a fixation rack. In the latter case, a catch must be available for veterinary examination and treatment.

TMR should be checked for length of particles in the ration, related to mixing time and pre-silaging activities. Body condition scores, rumen fill scores and faeces quality scores are suitable management instruments to evaluate feeding efficiency.

- Specific behaviour

Next to behavioural issues addressed in the clusters above, there are a few additional features of interest. For example, the ratio between standing time and lying time in a group of cows (e.g. the fresh cows). On a 24 hours basis the pattern may be as follows: resting and ruminating 10 hrs, lying and ruminating 12 hrs,

eating at feed rack 2 hrs. In between, cows will show walking activities up to 5 km per day. Locomotion and step length are indicators for claw health (Somers et al., 2003; Bergsten, 2004). Synchrony within the herd is an indicator for herd social behaviour.

Idle standing may be an indicator for claw health problems, general distress, poor cubicle condition. In average, low yielding cows show longer idle standing time than cows with high yield. The position of cows in a cubicle may be an indicator for cubicle quality (Dantzer & Mormède, 1983; Dantzer, 2002).

Farm management is supposed to perform cow observation on a regular routine basis for e.g. detecting disease signs in an early stage (*cow signals*, Hulsen 2004).

From the features addressed in the forenamed 4 clusters it appears that farm management plays a pivotal role in achieving optimal cow comfort. This also includes cow handling in general, cow—man interactions, general health care including participation in veterinary herd health programmes (Brand et al., 2001), cow observation skills, reproductive efficiency (interval calving—first oestrus, negative energy balance, cystic ovarian disease, sire evaluation).

Additional welfare-associated management issues refer to *lege artis* approaching invasive treatment like asking for veterinary anaesthesia when indicated, timely euthanasia for specific cows, injecting cows in the most appropriate way, timely seeking veterinary assistance, applying good hygiene practice.

## **Discussion and conclusions**

Optimizing features of cow comfort as addressed in the paragraphs above can be considered basic elements in providing appropriate conditions for achieving cows' welfare. Cow comfort features are closely related to the biological needs which have been identified. Moreover, it shows that the farm manager plays a pivotal role in this process. Cow observational skills are then the subsequent step to evaluate the outcome of adjusting the cows' environment and the associated cow behaviour. Several publications have recently been issued which all address the observation of cows, *cow signals* (Zaaijer & Noordhuizen, 2003; Hulsen, 2004).

Various forenamed cow comfort elements may be easily applied in newly designed barns. In existing barns it is often a matter of compromising between existing conditions and adjusting for more ideal conditions. The veterinarian may be of assistance to achieve those goals, when he/she is willing to exploit his/her observational diagnostic skills, to invest in developing these skills continuously, and to conduct the proper interpretation of results for the appropriate advice.

In order to provide the farmer with more time to spent on cow care and cow comfort, various devices have been designed which reduce both the labour load for the farmer and some of the time-consuming routine practices.

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