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## SCIENTIFIC RESEARCH ON VEAL CALF WELFARE

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### Summary

*Calf welfare is poor when calves are kept in individual crates and fed a diet lacking in fibre and sufficient iron. The systems which will improve welfare to an extent which is acceptable to the general public in Europe will involve group-housing, preferably with bedding, sufficient fibre to allow normal gut development and sufficient iron to allow normal activity and immune system function. While veal can still be produced in such systems and additional running costs are small. If the veal industry is to reverse the current decline in veal consumption in France and other European countries, the welfare of the calves must be considered.*

### Key words

*Welfare, calf, veal, housing, feeding.*

### Introduction to welfare research

There has been great development of the scientific study of animal welfare in recent years and some of the important work has been carried out on calves. The welfare of an animal is its state as regards its attempts to cope with its environment (Broom

1986). This state can be measured and will vary over a continuum from good to poor. An important aspect of the welfare of an individual is its feelings and scientists studying welfare are concerned to try to identify how much the individual may be suffering. The measures of poor welfare include those which indicate how much the animal has to do in order to try to cope and those which show that it is failing to cope. These may be measures of behaviour, physiological responses, immune system function, disease incidence or injury as well as measures of growth, reproductive success, mortality and life expectancy. Another approach to welfare research is to try to find out what would result in good welfare by assessing the strength of positive preferences for resources or possibilities to carry out certain behaviours. For further details on methods of assessing welfare see Broom and Johnson (1993).

The idea that those who use animals for their own benefit have obligations to ensure that the welfare of those animals is not poor is widespread in European society. The people who have such a responsibility towards calves include the owner of the animals, the manager of a stock unit, the men and women who clean, feed and handle the animals and specialists who have a shorter period of contact with the animals such as veterinary surgeons, vehicle drivers and abattoir staff. Such people should take trouble to find out about the needs of calves and about the aspects of their own work which may affect calf welfare.

#### *Determining animal needs*

The first stage in an investigation of animal welfare is to study normal biological functioning and the preferences of the animal. Such studies provide valuable information about the needs of animals. A need is a requirement, which is a consequence of the biology of the animal, to obtain a particular resource or respond to a particular environmental or bodily stimulus. Other information about needs is obtained by depriving the animal of the resource or opportunity to perform a behaviour and measuring any consequent indications of poor welfare. However, it is important to emphasise that the systems, which animals have to obtain resources and minimise adversity, themselves contribute to the needs of the animals. For example it is not just the nutrient but the means of obtaining it which is a need. The needs of calves are described in detail by Broom (1991) so examples only will be given here.

The calf needs to ingest colostrum very soon after birth and milk thereafter. It also needs to show sucking behaviour and if a calf is not obtaining milk from a real or artificial teat, it sucks other objects (Broom 1982, 1991, Metz 1984, Hammell *et al* 1988).

Calves need to rest and sleep in order to recuperate and avoid danger. They need to use several postures which include one in which they rest the head on the legs and another in which the legs are fully stretched out (de Wit 1985, Keliachar de Lauwere and Smits 1989, 1991).

Exploration is important as a means of preparing for the avoidance of danger and is a behaviour shown by all calves (Kiley Worthington and de la Plain 1983, Fraser and Broom 1990). Calves need to explore and it may be that higher levels of stereotypes (Dannemann *et al* 1985) and fearfulness (Webster and Saville 1981) in poorly lit buildings are a consequence of inability to explore.

Exercise is needed for normal bone and muscle development and calves choose to walk at intervals if they can, show considerable activity when released from a small pen and have locomotor problems if confined in a small pen for a long period (Warnick *et al* 1977, Dellmeier *et al* 1985, Trunkfield *et al* 1991).

Normal calf anatomical, physiological and behavioural development occurs only if the calves have some fibre containing material to eat (van Putten and Elishof 1978, Webster 1984, Webster *et al* 1985a) so it is clear that they need fibre in their diet after the first few weeks of life.

Grooming behaviour is important as a means of minimising disease and parasitism and calves make considerable efforts to groom themselves thoroughly (Fraser and Broom 1990). Calves need to be able to groom their whole bodies effectively.

A variety of nutrients are needed by calves. Sufficient iron is needed to allow normal activity and to minimise disease.

The needs of young calves are met most effectively by the presence and actions of their mothers. In the absence of their mothers, calves associate with other calves if possible and they show much social behaviour. The need to show full social interaction with other calves is evident from calf preferences and from the adverse effects on calves of social isolation (Broom and Leaver 1978, Danzter *et al* 1983, Friend *et al* 1985, Lidfors 1994).

### **Comparisons of veal calf housing and management systems**

#### *1. The systems*

The major housing systems which have been compared in studies of calf welfare are individual crates, group housing on slats and group housing on straw. Where calves are housed individually, the size of the crate and whether or not the sides are solid have been varied. Many aspects of diet are important in relation to welfare. For example, if inappropriate proteins or carbohydrates are fed, the calf may be unable to utilise them and if milk is acidified too much, calves may find it very unpalatable. However the two aspects of diet which have been of greatest concern in relation to calf welfare have been the amount of fibre and the amount of iron.

#### *2. Disease incidence*

The incidence of disease in young calves is too high, for example 25% of veal calves had to be treated for respiratory disease in a study by van der Mei (1987). The use of antibiotics to prevent disease is also a problem. It is important for calf welfare and for farm economics that disease levels be lowered.

One aspect of management which causes problems is the practice of mixing calves from different sources. Webster (1984) found that calves purchased and brought into a unit were five times more likely to require treatment for disease. Second is hygienic practice by farm staff and a third is early detection of disease. These variables seem to be more important than housing system in exacerbating disease.

Several studies (e.g. Perez *et al* 1990, Olsson *et al* 1993) have shown that disease incidence was high in group housing systems whilst Webster (1984) and Peters (1986) reported less disease in group housed calves and Webster *et al* (1985b) and Walner-Toews *et al* (1986c) found no differences. It appears that the best managed group housing systems are as good as well managed crate systems but poorly managed group housing systems can be particularly bad in respect of disease.

On average the provision of appropriate roughage does not affect disease incidence. Straw feeding increases the incidence of small superficial ulcers but there is no evidence that it has any effect on the incidence of large ulcers which would result in poor welfare.

Anaemic calves with a blood haemoglobin level of 5.5 m mol l<sup>-1</sup> haemoglobin are adversely affected by exercise (Piquet *et al* 1993) but immune system function and disease incidence were not affected until the haemoglobin level fell below 4.5 m mol l<sup>-1</sup> (Gygax *et al* 1993).

### 3. Abnormal behaviour

One kind of behavioural abnormality shown by calves, which indicates poor welfare, is prolonged inactivity. This is shown by anaemic animals and by those with inadequate stimulation. Calves which are unable to groom themselves properly or are otherwise deprived, may show excessive grooming of the front part of the body, often accompanied by ingestion of much hair to the extent that hair balls or bezaars form in the rumen (van Putten and Elishof 1978). Excessive sucking behaviour is also frequent in young calves which are deprived of a teat or teat-substitute to suck (Broom 1982, 1991). A further kind of abnormality of behaviour which indicates poor welfare is inability to carry out a movement which the calf frequently tries to show. For example, inability to adopt comfortable lying postures.

Some of the abnormal behaviour mentioned above may be repeated, relatively invariant and have no obvious function, i.e. it is a stereotypy.

The most frequent stereotypies in calves are oral, such as tongue-rolling. Ketelehar de Lawere and Smits (1989) reported such behaviour in calves kept in crates and noted that the behaviour occurred for 20-30% of the time in crates ranging in width from 70 to 170 cm. Hence it seems that lack of social companions or some inadequacy of diet or food provision method was the cause. Stereotypies generally indicate frustration or some other kind of lack of control by the animal over its environment (Mason 1991, Broom and Johnson 1993). It is not surprising, therefore, that they can occur in group housing systems but the incidence, in studies where the calves are not unduly disturbed by observers, is much higher in individually housed than in group-housed calves (Andreue *et al* 1980, Webster *et al* 1985, Werenaga 1987).

### 4. Physiological measures

Emergency physiological responses, such as those of the adrenal cortex, are useful indicators of short-term problems like those associated with handling and transport. However, repeated use of the adrenal cortex can sometimes be detected retrospectively by the use of a challenge test. Danzter *et al* (1983) found that tethered calves showed a significantly greater response to ACTH challenge than did group-housed calves. Similarly, Friend *et al* (1985) found greater cortisol responses to ACTH challenge in calves which were tethered or kept in an individual pen than in group-housed calves.

The effects of the absence of fibre in the diet on physiological functioning and anatomical development in the gut are just as substantial as are the effects on the occurrence of abnormal behaviour. Inadequate dietary iron also has a wide range of effects on the physiological functioning of the calf (Gygax *et al* 1993, Lindt and Blum 1993, Ceppi and Blum 1994).

### Discussion

The data summarised in this paper clearly indicate that the welfare of calves is poor when they are kept in individual crates and fed a diet low in iron and deficient in fibre. Welfare is improved by group-housing with bedding provided, as long as stockmanship and disease control is good. Welfare is always improved by provision of a diet which does not cause anaemia and which includes adequate fibre and nutrients. There are indications from several studies that when dietary fibre, straw bedding and group housing are used, while meat can still be produced (Mosser *et al* 1994, Morisse *et al* 1995). If crate size is increased above 80-85 cm in width, it is just as economic to keep the calves in groups. Hence calf welfare can be substantially improved if veal producers provide some roughage, enough iron to keep the haemoglobin level at about 5 m mol l<sup>-1</sup>, and keep the calves in groups, preferably with a bedded area. Groups of 20 calves with 1.5-2 m<sup>2</sup> per calf have been successful commercially.

Why should veal producers change the methods of housing and management as described above? The clearest answer to this is that there is public pressure for changes to be brought about which improve calf welfare. Mainsant (this volume) reports that veal consumption has declined by 25% in France and by 45% in Germany in the last seven years. There have also been significant declines in other E.U. countries such as Italy. Part of the reason for this must be concern about the welfare of the animals. The decline in veal consumption in younger people in France is greater than that in older people. This is typical of issues where animal welfare is a factor and is extremely unlikely to be due to a differential drop in spending power in younger people. Veal producers need to improve their image with the public and poor calf welfare is now the most important part of their image problem. If the decline in veal consumption continues, as seems likely if no changes in production methods occur, the costs will be very great for the industry. These losses are likely to far outweigh any losses in veal sales resulting from a small increase in price following increases in production costs associated with methods modified so as to improve welfare. The veal industry cannot afford not to change in a way which will improve calf welfare and be perceived by the European public as doing so.

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