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WELFARE CONSIDERATIONS IN CATTLE PRACTICE

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There is a wide range of cattle welfare problems but veterinary practitioners can offer treatment or advise on methods to alleviate them. The welfare of an individual is its state with regard to its attempts to cope with its environment (Broom 1985, 1986). The position of an individual on a continuum from good to poor welfare can be assessed using a variety of measures (Smidt 1983, Broom 1986).

Ill-treatment and neglect

Human actions which can lead to poor cattle welfare include ill-treatment, neglect and inadequate production systems. Ill-treatment occurs most frequently when animals are being moved around the farm, when they are being loaded into or out of vehicles, or when they are at market or lairage. Those who do ill-treat animals can be advised of likely economic effects of their actions as well as being told about the laws on the subject. Neglect includes failure to provide an adequate diet, failure to treat disease and the lack of normal husbandry procedures. The diet may be inadequate in nutrient composition or in quantity. Cattle are sometimes undernourished for a period, whilst food is scarce or expensive, with the expectation that compensatory growth will occur when more food is provided. If the undernourishment amounts to starvation and this is clear from the condition of the animal, then this is serious neglect. Lack of knowledge on the part of the farmer may result in the provision of a poor diet or in failure to treat disease. This is poor stockmanship, a very important cause of welfare problems. Advice on good husbandry methods can be an important veterinary service. If animals are diseased and require treatment there is a moral obligation upon the veterinary practitioner to treat them, as specified by the veterinary oath. In certain circumstances, treatment without any prospect of payment may be necessary. In other circumstances it may be best to call in the State Veterinary Service, the police, or the R.S.P.C.A., even if to do so might mean losing a client.

Welfare and production

Improved welfare often leads to improved production. If the welfare of a dairy cow is improved there is often a greater milk yield and if the welfare of young calves is improved, the resulting increases in growth rate and survival chances lead to economic advantages for the farmer. In other situations, however, improving welfare leads to reduced profits, for example when stocking density is increased to the detriment of welfare. Modern

cattle husbandry systems do lead to some welfare problems, as discussed below and in the accompanying papers in this volume. A general change in cattle management methods has been an increase in production pressure. nutritional expertise has increased to the point where animals now convert feed to meat and milk very efficiently. If animals are pushed hard energetically, there need not be welfare problems and management difficulties but these are more likely and should be taken into account when advising farmers about which system to choose.

Whilst cattle management has been changing, our knowledge of cattle physiology and behaviour has been improving. It is clear that they have complex regulatory processes, elaborate social structure and sophisticated learning ability (Craig 1981, Broom 1981, Kilgour and Dalton 1984, Stricklin 1984). These results have made many animal scientists reconsider the effects of conditions and procedures on farms, both in terms of their efficiency as regards production and with respect to the welfare of the animals. Welfare problem areas include housing systems, handling procedures, transport conditions, slaughter methods, situations at markets, mutilation of animals and provisions for emergencies such as fire.

Housing and management: general points

Feeding of housed cattle may lead to difficulties for the animals because the acquisition of food in housing conditions is very different from that when grazing. Physical difficulties may occur, as described by Cermak (1987, and this volume), but social factors are also very important. Cattle synchronise their feeding to a large extent (Benham 1982, Potter and Broom 1987) so where group feeding is possible, enough feeding places for each animal are required (Metz 1983, Wierenga 1983). Those animals which cannot find a feeding place may not get sufficient food and it is likely that there are adverse effects on their welfare. The precise effects of the frustration which occurs when food is inaccessible because of competition remain to be determined. Competitive feeding situations where there are no individual feeding places pose extra problems for cattle. The subordinate individual has to attempt to obtain food despite the attacks or threats of other individuals. Bouissou (1970) found that the greater the extent of the barrier between feeding places for cows, the fewer the attacks which occurred (Fig 1). A trough which requires subordinate cows to come close to dominant individuals results in those subordinates walking greater distances and taking longer to obtain a meal (Albright 1989 Fig 2). Calves of low social rank obtain less of the favoured food if trough space is restricted (Broom and Leaver 1978, Broom 1982). In order to minimise such welfare problems which are often associated with poor weight gain, farmers should provide feeding spaces for all individuals, preferably with barriers between the individual places. Adaptation to a single food

source is possible for cattle, however, for a transponder operated feeding stall can be quite successful (Albright 1981), but certain individuals in a herd may have difficulties in such systems.

Another general problem for housed cattle is having to stand on floors which are wet, slippery, uneven, or hazardous because of sharp edges. Slippery slats can lead to difficulties in standing or lying (Andreae and Smidt 1982, Fig 3). These and other inadequacies of flooring can result in limb injuries, foot lameness, tail-tip necrosis and various diseases. Lameness is the greatest welfare problem of housed dairy cows and factors influencing its occurence include floor quality and poor drainage which results in cows standing in slurry (Wierenga and Peterse 1987).

The transport of animals is discussed by Mews in this volume but it is clear that much scientific investigation of cattle handling and transport procedures is needed. Recent studies of interest include those of Grandin (1983) on procedures for moving cattle in races and that of Kenny and Tarrant (1982) on the adverse effect of social mixing on the welfare and meat qualtity of transported bulls. When cattle and other animals are slaughtered the procedures are sometimes carried out inefficiently with consequent suffering before animals die. All animals should be stunned properly before any slaughter method, including shechita or halal killing methods, are carried out. A frequent problem for veterinary practitioners concerns casualty slaughter. The Transit of Animals (Road and Rail) Order, 1975 states (Article 11(i)) that no unfit animal may be carried if it is likely to be subjected to unnecessary suffering. Similarly, the Protection of Animals Act, 1911 states (Article 1 (i)(b)) that it is an offence for any owner; agent , consignor or carrier to cause an animal to be carried so as to cause unnecessary suffering. In practice, these laws should result in severely injured or sick animals, for example any that cannot stand, being slaughtered on the spot rather than being transported to an abattoir. Farmers should always receive a price for the carcase which relates to meat quality for there should be no penalty for those, who by not transporting live, prevent pain and suffering.

Calf welfare problems

In the first few days after birth the major calf welfare problems are enteric and respiratory diseases. The calves of dairy cows may fail to obtain sufficient colostrum for a variety of reasons (Edwards 1982, Edwards and Broom 1982, Broom 1983). Management practices which maximise the chance that colostrum will be obtained and minimise contact with pathogens have important beneficial effects on calf welfare.

Dairy calves are deprived of their mother from an early age and many are individually housed so that they are confined in a small space and deprived of all or most social contacts. In the European Community, seventeen million out of a total of twenty three million veal calves per annum are kept in small crates and fed on a diet with inadequate iron and roughage. Many animals used as replacers for dairy herds are also individually housed. The abnormalities resulting from this rearing method are clearly documented and alternative, group-housing systems are available (Webster, this volume). Isolation rearing can have adverse effects on later social and maternal behaviour (Broom and Leaver 1978, Broom 1982). Group-housing systems involving feeding milk replacer from a set of teats and solid food from a trough work well. Problems of uneven weight gains are minimised if one teat for every two calves is provided and these are put close together (Barton 1983, Barton and Broom 1985).

Since young calves are so vulnerable to disease and are generally affected by adverse physical and social conditions their welfare is often poor when they are transported and taken to market. Despite this fact, a million young calves per annum are transported from France to Italy for veal production and many young calves are taken to market in the United Kingdom. The British calves should be more than a week old before marketing but many are not and even at one week the calves are ill-equipped to cope with the vicissitudes of vehicle and market conditions. In most European countries, calves are not marketed before weaning and the British practice is regarded as undesirable for production and welfare reasons. Calves should be sold from farm to farm, if movement at an early age is essential, or should be marketed after five weeks of age.

Beef cattle welfare problems

The housing conditions for calves destined for beef production are sometimes similar to those kept for veal production so they have similar welfare problems. Older beef animals are kept in small individual pens or are tethered in some countries and they then show much stereotyped behaviour. Riese et al 1977 reported that stereotyped behaviour included tongue-rolling, weaving movements and self licking. Wierenga (in prep.) reported that one third of young, individually housed bulls spent several minutes in every hour showing tongue-rolling. Physiological responses to confinement also occur. Ladewig (1984) reported that tethered bulls showed more frequent episodes of high blood cortisol levels than did bulls able to interact socially in groups. Such abnormal behaviour and physiology is probably exacerbated by both social deprivation and inability to perform behaviours because of spatial restriction. Individual housing of beef animals is more frequent when they are bulls than when they are steers. In Germany 98% of

beef animals are bulls but in the United Kingdom 92% are steers. The U.K. situation is likely to change following the ban on growth promoters.

Fighting and mounting can lead to welfare problems when beef animals, especially bulls, are kept in groups. The most important way of minimising such problems is to keep the animals in stable groups for social mixing leads to much fighting with consequent injuries, bruising and extreme physiological responses (Kenny and Tarrant 1982). In stable groups, mounting may lead to more injury than does fighting (Appleby and Wood-Gush 1986). Animals which are frequently mounted become bruised and may suffer severe leg injuries. Mounting can be greatly reduced by the use of overhead bars, which physically prevent it, or an electrified grid which deters animals which wish to mount. The brief initial experience of an electric shock has a relatively small adverse effect on welfare as compared with the serious effects on animals which are repeatedly mounted.

The stocking density of beef animals and the flooring provided also have considerable effects on welfare. High stocking densities lead to more aggression, injury and bruising. Beef animals increase rapidly in body weight but they have little exercise if they are housed in small pens and their leg growth may not be able to keep pace with that of the rest of the body. The final weights reached are much higher now than they used to be so the legs are scarcely adequate to support the body. The consequence is cartilage damage, clear indications of limb pain and obvious difficulties in standing and lying (Dämmrich 1987). Graf (1984) found that these problems were absent if fattening bulls were reared on deep straw and that such conditions also led to fewer behavioural problems.

Dairy cow welfare

The major welfare problems for housed dairy cows are lameness, mastitis and difficulty in getting feeding and lying places. Most of these problems are associated with the design of the housing system but some are a consequence of poor stockmanship. The causes of both lameness and mastitis are multifactorial and there is an interaction between the response of the animal to its conditions and the likelihood of clinical infection. A reduction in pathogen challenge will usually help to reduce disease incidence but changes in management methods, of the kinds which have other beneficial effects on welfare, can have an effect on minimising disease which is as great or greater. Studies at the Institute for Animal Disease Research, Compton have shown that there are positive correlations between lameness and mastitis incidence. High production increases the occurrence of both lameness and mastitis. Mastitis has declined in dairy herds where concentrate feeding

has been reduced following the introduction of milk quotas and in an experimental study, Manson and Leaver (1986) found that the lameness incidence was higher in cows fed on a high protein diet. The incidence of lameness can be reduced by the use of foot baths and by hoof trimming but much remains to be discovered about the conditions which lead to individuals being likely to become lame.

Space allowances are often quoted for housed dairy cows, for example Arave et al (1974) quoted 2.3m² per cow, but house design and social stability must be taken into account when deciding on the best space allowance in any building. Social mixing leads to various behavioural and reproductive difficulties. (Bouissou 1976). Even when social disruption is minimal, cows need places to retreat so as to avoid confrontation with other individuals. Potter and Broom (1987) report that cows use cubicles and feed barrier sections for this. If there is a shortage of feeding places, due to the highly synchronised behaviour of dairy cows (Benham 1982, Wierenga 1983, Potter and Broom 1987) there are considerable effects on the cows. Metz and Meeking (1984) reported a dramatic increase in chasing and it is likely that the welfare of cows is poor when they are unable to get a feeding place because their herd mates are feeding. Narrow passageways in a cubicle house can cause problems for cows, for example Konggaard (1983) saw more contact, yielding, turning and waiting if passageways were 1.2m wide than if they were 2m wide. An inadequate number of cubicles, such that not all cows can lie at once, leads to more aggressive interactions and low-ranking animals having to lie in passageways where conditions are dirty and likelihood of injury or disease is high (Kaiser and Lippschitz 1974, Friend et al 1977, Wierenga 1987). Other welfare problems for dairy cows concern ill treatment or neglect by the stockman and producers when it comes to milking. The use of an electric dog or of physical force in the collecting yard are not conducive to good welfare or good milk production. Good stockmen are consisent in their milking parlour procedures and deal with the cows in a quiet, predictable way.

Welfare consequence of future developments in cattle management

Conventional methods of cattle breeding have changed the animals considerably during recent years and future changes are likely to be accelerated by new possibilities for genome manipulation. For example selection for double muscling in beef cattle and the possibility of transferring genes which increase growth rate or modify final body form could both result in animals with larger, faster growing bodies. New growth promoters, if these are allowed to be used could have the same effect. These techniques need not have any adverse effect on

welfare but any increase in production pressure could lead to more problems. In addition, body weight increase without corresponding increase in leg size and strength could result in more lameness. Any modification of animals should be checked carefully to ensure that animals do not find it more difficult to cope with their environment. Some modifications of animals could result in improved welfare, for example if genes were implanted which increased the efficiency with which disease could be combatted by the individual.

The crossing of breeds of animals can lead to welfare problems for cows if a large breed of bull is crossed with a smaller breed of cow, resulting in increased calving difficulty. Similiar problems can arise if embryo transfer occurs. Multiple implantation of embryos could lead to other problems. The actual transfer of embryos could be a major operation which is traumatic for the cow but transfer procedure should be such that cow welfare is not worse than that of cows undergoing a normal pregnancy.

A quite different development area which can have effects on welfare is the development of microprocessors and other electronic control units. Cows can already carry transponders which allow them to be fed individually and this methodology could be improved to minimise the chances that any individuals fail to obtain food. Electronic systems could allow cattle greater control over their physical environment for example by giving them the opportunity to regulate environmental temperature and air-flow rates. Lack of control is a major cause of welfare problems (Broom 1986) so such possiblities could improve welfare. The development of robotics is likely to make possible in the near future the automatic milking of cows. Cows would be recognised individually on entry to a milking stall and a computer which had been pre-programmed with their udder coordinates would attach a milking machine to them. Provided that this could be done without any discomfort to the cow it could improve welfare since the cow could come to be milked whenever she chose to do so.

Summary

The major cattle welfare problem, apart from those resulting from ill treatment and neglect, is the close confinement in small crates of calves and fattening bulls. In veal calf management there are also problems resulting from low levels of iron and roughage in the diet. Amongst dairy cows, lameness and mastitis are major welfare problems and certain housing systems lead to other problems. For all cattle, transport and associated handling result in welfare problems. These are particularly traumatic for young calves which are taken to market before reaching weaning age and part of the welfare problem is often increased disease

incidence. Bruising and other injuries are very frequent when bulls from different social groups are mixed at any time and yet this often occurs prior to transport or at lairage. Other welfare problems during transport of any cattle are the consequences of moving casualty animals, poor loading techniques or facilities, poor vehicle design, poor driving or very long journeys. Slaughter procedures are sometimes inadequate and stunning should always be carried out prior to slaughter. Farmers should be advised to give cattle: firstly, more control over their enviroment; secondly, predictable but diverse surroundings; and thirdly, rapid treatment if they contract disease.

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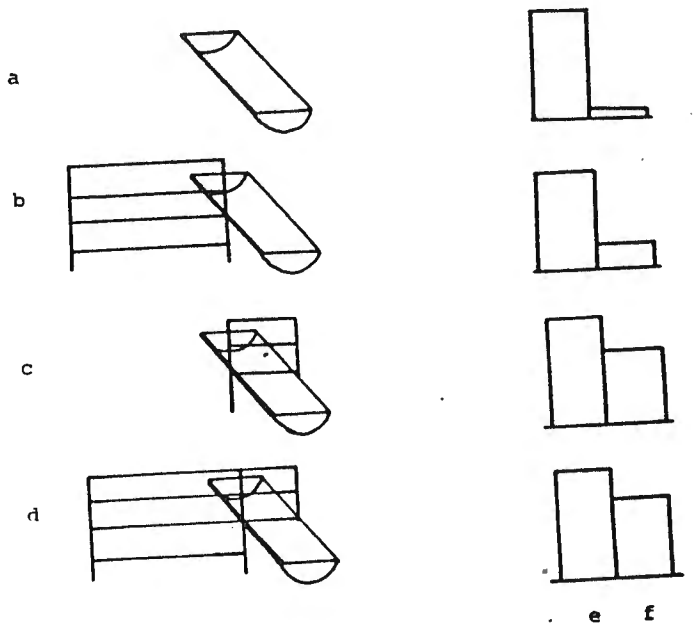
Figure 1

Physical barriers affected feeding times by cows ranking high and low in a competitive order. With no barrier (a) the low ranking cows were scarcely able to feed. A body barrier (b) improved the situation slightly for the low ranking cows but a head barrier (c) and a complete barrier (d) had a much greater effect. (Redrawn after Craig 1981, data from Bouissou 1970).



Feeding trough barrier

e = High rank

f = Low rank

Mean feeding time in 3 minute competition test.

Figure 2

The paths of two cows in a herd after food is provided in a food wagon are shown. Animal (a) was found to be high in a competitive order wheras animal (b), which was low in that order, walked further because of displacement at the food wagon and took longer to feed. After Broom 1981, modified after Albright 1969).