

# SOCIAL ROLES IN CATTLE: A PLEA FOR INTERCHANGE OF IDEAS BETWEEN PRIMATOLOGISTS AND APPLIED ETHOLOGISTS

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## Abstract

*Animal Welfare* 1993, 2: 339-346

*Social role has been defined as a pattern of behaviour characteristic of a class of individuals within a group. The concept was developed by primatologists both to describe individual variation in behaviour in social groups and to be used in addition to hierarchy as a model for primate social organization. Cattle have been shown to express considerable individual variation in behaviour. Furthermore, cattle and primates show some similarities with respect to their social behaviour. This may indicate that the concept of social roles might be useful to those studying cattle behaviour. After a brief literature review it is concluded that the concept may indeed be applicable to cattle. The possible welfare implications of this are first, that it would offer a new approach for the study of individual differences in behaviour - important to the understanding of how animals cope with their environment in captivity. Second, it could help the understanding of social behaviour in domestic species. It is suggested that an interchange of ideas between primatologists and applied ethologists is needed.*

**Keywords:** *animal welfare, cattle, non-human primates, role, social behaviour*

## Introduction

As used by primatologists, the concept of social role means a regular and predictable pattern of behaviour characteristic of a subgroup of individuals within a social group (Fedigan 1982).

The concept was developed in primatology to account for two different facts. First, primatologists have long been aware that different classes of monkeys within a group behave in different ways (eg Bernstein & Sharpe 1966). Second, as the complexities of social behaviour were revealed by long-term field studies, it became apparent that hierarchy was not enough to describe social organization within primate groups (Deag 1974, Hinde 1978). Therefore, the concept of social roles developed both to describe individual differences in behaviour and to be used in addition to hierarchy as a descriptive model for primate social behaviour.

Cattle have been shown to express considerable individual differences in their behaviour (eg Kerr & Wood-Gush 1987). Both cattle and primates are K-selected species, ie they have relatively long life, high parental care, low birth and death rates and late reproduction (Hafez 1969, Brown 1975, Deag 1982, Jolly 1985, Phillips 1993). Furthermore, they both live in matrilineal groups of relatively stable membership and show several co-operative behaviours and individual recognition (Wilson 1975, Leuthold 1977). As in primates, long-term field studies (eg Reinhardt 1983) have shown that cattle social behaviour can not be explained solely in terms of dominance-subordination relationships.

Despite the above considerations, the concept of social role has not been applied to any domestic species. The aim of this communication is to discuss its applicability to Zebu cattle (*Bos indicus*) and European cattle (*Bos taurus*). First, we shall present a brief review of those studies that may suggest that the concept of social roles would indeed be useful to those studying cattle behaviour. Second, we shall discuss the welfare implications. Before doing this, some preliminary considerations on the role concept should be made.

#### Some considerations on the role concept

The concept of social roles is not without problems (Fedigan 1982) and some of them are relevant to its possible application to non-primate species. First, the concept of social roles has been given multiple usages (Fedigan 1982). For example, some authors have used the concept to differentiate between classes of individuals in terms of their behaviour. Often, these classes have been defined with respect to age, sex and status (eg Bernstein & Sharpe 1966, Fedigan 1976). Conversely, others have used it to refer to each single behaviour performed by a subgroup of individuals who share one or more attributes. For example, Gartlan (1968) in a study on vervet monkeys described seven single behaviours as social roles. These were territorial display (jumping around), social vigilance (looking out), social focus (being the object of friendly approaches), making friendly approaches, territorial chasing (the chasing out and exclusion of intruders from the group territory), punishing (interfering in intra-group aggression) and leading (the initiation of compact group movements).

Second, the concept of social roles was developed as a descriptive tool to study primate social behaviour and does not correspond to an individual's motivation for behaving in a particular manner (Fedigan 1982). In other words, animals are not necessarily conscious of performing a role but come to do so through a set of factors that are called the determinants of the social role (Hinde 1974). Fedigan (1982) suggests that these factors may be divided into biological, psychological and social types. Biological factors would include age, sex and kinship. Psychological factors would refer to attributes such as placidity, nervousness etc. Finally, social factors would include aspects such as social facilitation, social learning and social inhibition. Therefore, when analysing social roles in any species it is important not just to describe which patterns of

behaviour are performed by particular classes of individuals but also to investigate what the determinants of the roles are.

In this paper the concept of social role will be used to refer to each single behaviour consistently performed by a subgroup of individuals within the social group who share one or several attributes. Two of the several social roles studied in primates (namely social focus and leading) will be considered.

### **Social focus in cattle**

In a study on social behaviour in Zebu cattle, Reinhardt and Reinhardt (1981) found that cows form long-lasting affiliative relationships involving licking and/or grazing partnerships. These relationships are not evenly distributed across the herd members, for some individuals may be involved in many more partnerships than the others. The question here is why some animals perform this social focus role, ie what are the determinants of the social focus role? Several factors are involved in the patterning of affiliative relationships in cattle. These are:

#### ***Matrilineal kinship***

In European cattle, cows lick their offspring more frequently than they lick unrelated herd mates (Reinhardt *et al* 1986). Similarly, Sato *et al* (1991) found that cows lick relatives more often than unrelated individuals. In Zebu cattle, the effect of kinship is unknown, even though long-lasting partnerships are established between both related and unrelated individuals (Reinhardt & Reinhardt 1981).

#### ***Rank***

In European cattle, social licking is performed more often by low-ranking animals than by high-ranking animals (Reinhardt *et al* 1986), and high-ranking individuals receive more grooming than low-ranking individuals (Wood 1977). Furthermore, it has been described that animals lick more often (Benham 1982) or for longer periods (Sato 1984) those individuals that are a few places higher in the rank. In contrast, rank does not seem to play such an important role in Zebu cattle. Indeed, Reinhardt and Reinhardt (1981) found that the individuals involved in more affiliative relationships were not particularly high-ranking. However, this study seems to be the only one dealing with affiliative relationships in Zebu cattle and therefore no definitive conclusion can be given.

#### ***Familiarity***

Familiarity plays an important role in both European and Zebu cattle affiliative relationships. For example, in European cattle, Sato *et al* (1991) found that familiarity from an early age was the most important factor affecting social licking, animals licking familiar individuals much more than unfamiliar ones. In Zebu cattle, long-lasting partnerships are also established when the animals are very young (Reinhardt & Reinhardt 1982).

***Are the determinants of the social focus role similar in cattle and primates?***

The evidence presented so far suggests that the determinants of the social focus role *are* similar in cattle and primates. Indeed, in primate societies kinship and rank are the main features determining social attractiveness. The general trend is that primates tend to groom relatives and/or high-ranking animals. Also, competition to groom top-ranking animals can lead to each individual grooming those that are immediately higher in the ranking order (Seyfarth 1983). Familiarity seems to be more important in cattle than in primates. However, familiarity and kinship are not necessarily alternative explanations, for familiarity is probably the most common mechanism of kin recognition in mammals (Walters 1987). Calves with herds which are allowed to organize themselves, ie are not interfered with by man, spend their first months of life together with all the other calves of their herd (Reinhardt & Reinhardt 1982) and therefore become familiar at an early age with both related and unrelated individuals. In contrast, young primates interact more with their kin (Walters & Seyfarth 1986) and therefore are likely to become more familiar with related individuals than with unrelated individuals. This could explain why familiarity *per se* seems to be more important in cattle than in primates.

**Leading (spatial leadership) in cattle**

Spatial leadership has received particular attention in cattle. A spatial leader can be defined as an individual within a group who decides the direction and time of group movement throughout the group's home range (Syme & Syme 1979). Syme and Syme (1979) review ten studies on leadership in cattle. The general conclusion is that there is a tendency towards structured movement patterns, often with one animal consistently moving in front of the group. However, order can vary depending on the situation. In most cases there is no significant correlation between leadership patterns and rank. In fact, only two studies out of ten report that such a correlation exists and in one of them competition for food could have played a role in determining the order of movement, thus masking leadership *per se* (Syme & Syme 1979).

A more recent study (Reinhardt 1983) confirms these general results. Furthermore, this study is particularly interesting because it was done over several years and using a herd living in semi-natural conditions, rather than in a restricted environment. The study concluded that there is no correlation between rank and leadership, and that in mixed herds leading animals are old females (Reinhardt 1983). The question follows then of what makes a particular cow the leader of the group, ie what are the behavioural constraints that determine which animals occupy the leading role? It is interesting to recall here that when leadership has been studied together with social focus, the leader cow has happened to be the individual taking part in the highest number of grazing partnerships (Reinhardt & Reinhardt 1981, Reinhardt 1983). Interestingly enough, one study on leadership in pigs also failed to find any correlation between leadership and dominance. It was suggested that leadership is due to the formation of affiliative associations, so that if one animal moves the other in the pair will immediately follow (Meese & Ewbank 1973). In summary, it might well be that leadership in cattle is

dependent on affiliative relationships. The factors affecting such relationships have already been discussed.

Finally, a further point deserves special attention. Hinde (1974) quotes an example in gorillas from which he concludes that role behaviour may sometimes be guided through awareness of the consequences. Similarly, Reinhardt (1983) describes a particular observation in which, when the leader cow was prevented from leaving the enclosure, the herd did not move. Eventually, two cows walked forwards and backwards for a while until the herd followed them. When the leader was released, she took over the leadership. It is tempting to conclude that the members of the herd were expecting to be led by a particular animal. Furthermore, the behaviour of the leader on being released would indicate that she actually aimed to lead the herd. If this is the case, spatial leadership in cattle would be something else than some animals reacting faster than others and stimulating their fellows, as it has been suggested for pigs (Meese & Ewbank 1973). Sato (1982) supports this view by stressing that the herd does not immediately follow the individual that happens to initiate a particular activity.

#### *Are the determinants of the leading role similar in cattle and primates?*

The determinants of leadership in primates are controversial (Richard 1985). However, as in cattle, rank does not seem to be correlated with leadership, at least in species living in multi-male groups consisting of several adult males, several adult females and their offspring (Bygott 1974, Rhine 1975).

Two factors have been suggested to determine leadership. Fedigan (1982) suggests that at least in some species, those individuals having the best knowledge of resources and terrain within the group home range usually lead. Whether this applies also to cattle is not known, but it does seem that leadership is to some degree dependent on experience (Reinhardt 1983).

Individual differences in fearfulness may also be important in determining the order of movement in primates, with the most confident animals leading the group (Rhine 1975, Goodall 1986, Reinhardt *et al* 1987). Again it is not clear whether this is the case also in cattle but Reinhardt (1983) suggests that self-confidence is a prerequisite for the acquisition of spatial leadership.

#### **Conclusions and welfare implications**

The evidence presented so far is by no means conclusive. However, it does suggest that in cattle, some adult females may perform a social focus role, while others probably perform a social focus/leading role. Furthermore, information is available on the determinants of such roles and it is noteworthy that some of the determinants that are important in primate societies also play a role in cattle.

If the concept of social roles turned out to be fully applicable to domestic species, two welfare implications would follow. First, it would offer a new approach for the study of individual differences in behaviour in domestic species. Study of individual differences

in behaviour are important to aid understanding of how animals cope with their environment in captivity (eg Wiepkema *et al* 1987) and is therefore relevant to animal welfare. In this regard, study of the determinants of the social roles would be particularly interesting, to understand why individuals differ in their behaviour.

Second, the concept of social roles could help the understanding of social behaviour in domestic species. Social behaviour has important implications for animal welfare. Even though the effects of aggression and dominance-subordination relationships on animal welfare have so far received the greatest attention (eg Zayan 1988) it is clear that social behaviour may affect welfare in other ways. For example, it has been shown both in pigs (Arnone & Dantzer 1980) and goats (Lyons *et al* 1988) that the presence of another individual with which social bonds have been established may moderate the effect of some environmental stressors. Therefore, taking account of the complexities of social behaviour is important in animal welfare studies.

The underlying aim of this communication is to show that a concept developed by primatologists may be useful to those studying domestic animal behaviour. This draws attention to the need for an interchange of ideas between primatologists and applied ethologists.

#### Acknowledgements

The authors thank Hans Herrmann and Ute Knierim for their comments on the first manuscript. The first author was supported by a studentship granted by the Government of Catalonia, Spain.

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