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ScienceDirect
Livestock Science 106 (2007) 182–188
LIVESTOCK SCIENCE
www.elsevier.com/locate/livsci

Relationship between maternal defensive aggression, fear of handling and other maternal care traits in beef cows

S.P. Turner *, A.B. Lawrence

Scottish Agricultural College, Sir Stephen Watson Building, Bush Estate, Penicuik, Midlothian, EH26 0PH, UK

Received 3 April 2006; received in revised form 19 July 2006; accepted 1 August 2006

Abstract

Aggressive defense of the calf by beef cows can result in serious and fatal injuries to producers, veterinarians and members of the public. This risk is likely to be exacerbated by the further extensification of pasture-based systems, the increasing use made by the public of agricultural land for recreation and the need for increased handling of the calf to comply with EU ear tagging regulations. Selection for reduced flightiness from humans during routine husbandry tasks is being investigated in some countries and interest in selecting for stronger maternal behaviours to suit low-labour input systems is emerging. A potential consequence of these selection approaches could be to inadvertently select cattle that aggressively defend calves against human approach with an associated increase in risk of human injury. This article assesses the potential for correlated changes in maternal defensive aggression resulting from selection on flightiness and calf survival or maternal care traits and examines the scope for including maternal defensive aggression as a trait in its own right in selection indices. Evidence is presented which shows a phenotypic relationship indicating that both reduced flightiness and strong maternal care are associated with elevated maternal defense in several species. Selection for the former traits could lead to undesirable changes in maternal aggressiveness to handlers if confirmed at the genetic level in cattle. Maternal defensive aggression is weakly, but significantly heritable in beef cattle. Selecting cattle intermediate in expression of fear and maternal care or including selection against aggressiveness itself in breeding programmes may benefit handler safety.

Keywords: Maternal aggression; Selection; Flightiness; Temperament; Safety; Tagging; Cows

1. Introduction

During lactation in predated species, including cattle, a reduction in fear responsiveness of the dam to novel and potentially dangerous situations facilitates the expression of defensive aggression in protection of the young (Fleming and Luebke, 1981; Hård and Hansen, 1985; Ferreira et al., 1989). Since humans may be perceived as a threat to the calf, a cow may show protective behaviours which, especially in countries where calving of infrequently handled cattle occurs outdoors, can place a handler, veterinarian or member of the public in danger (Le Neindre et al., 1998, 2002).

In addition to affecting human safety and offspring survival, temperament traits of cattle can also influence handling efficiency, the likelihood of the animals themselves receiving injuries and the rate of weight gain. Most temperament traits of commercial interest in beef cattle that have been studied to date have been found to have a significant heritability. For economic, human safety and animal welfare reasons, many authors have suggested selecting animals on the basis of these traits (see Burrow, 1997 for a review); suggestions which are being

* Corresponding author. Tel.: +44 131 535 3208; fax: +44 131 535 3121.
E-mail address: simon.turner@sac.ac.uk (S.P. Turner).

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doi:10.1016/j.livsci.2006.08.002

investigated at the commercial level. In Australia for example, industry trials have commenced using several beef breeds to investigate the inclusion of flightiness of cattle on exit from a crush into the BREEDPLAN genetic evaluation system (Anonymous, 2002), whilst, in dairy cattle, temperament in the parlour and ease of milking have been regularly recorded by the Holstein Friesian Society of Great Britain and Ireland since 1992 (Brotherstone, 1995). Whilst selection for reduced flightiness of non-lactating beef cattle could facilitate safe handling in some contexts, it could impact on the extent to which a cow will defend her calf against handlers with implications for handling difficulties and danger after parturition.

In many countries, especially in light of Common Agricultural Policy (CAP) reform, greater extensification of some pasture systems is anticipated, accompanied by a reduction in labour input per animal (Waterhouse, 1996). This, together with the longer-term trend towards increasing the animal to handler ratio, has triggered interest in selecting animals or using breeds that can calve outdoors with little assistance and which show strong maternal behaviours, including defense against predators. Selection for maternal behaviours that promote offspring survival could, however, also exacerbate the aggressiveness of cattle after calving (Grandinson, 2005).

This article considers whether selection for reduced flightiness during routine husbandry procedures and selection for maternal care traits and calf survival could impact on maternal defensive aggressiveness. It also examines whether it is technically possible to directly select against maternal defensive aggression of beef cows as a trait in its own right and considers how recording could be integrated into normal husbandry procedures.

2. Risk for human safety posed by maternal defensiveness

Analysis of the annual fatal accident statistics published by the UK Health and Safety Executive (HSE) from an 11 year period shows that 14 people (8 farm workers and 6 members of the public) received fatal injuries as a direct result of a cow's action when there were calves at foot whilst 4 fatalities (all farm workers) occurred as a result of cows without calves in the same period (Table 1, Health and Safety Executive, 1993–2003). These mortality figures give no indication of the extent of unreported non-fatal injuries, which is likely to be high (Lindsay et al., 2004). Importantly, whilst there has been a gradual reduction in fatal agricultural accidents in recent decades, no such decline can be detected in the HSE statistics in the number of incidents resulting from maternal defensive aggression in cattle.

To comply with current European Union (EU) regulations (European Council regulation 1760/2000) ensuring the traceability of meat products, beef calves in all EU Member States are required to be double-tagged by the age of 20 days. A similar initiative has been taken in Japan and it is likely that major exporting countries such as New Zealand and Australia will also tighten their own traceability standards (Souza-Monteiro and Caswell, 2004). The handling of calves during the sensitive postpartum period is therefore unavoidable in many countries and increasing elsewhere, although it is too early to identify the impact of compulsory tagging on injury statistics. Often tagging occurs in environments where the restraint of the cow in a handling facility is not feasible and this exacerbates the risks to safety posed by maternal defensiveness. In a recent UK survey for example, Lindsay et al. (2004) reported that 12% of respondents had received an injury whilst ear tagging cattle.

Maternal defensive aggression can therefore be viewed as one of the greatest threats to handler safety in an industry where opportunities for routine contact between handlers and non-lactating cows is decreasing, contact in the postpartum period is becoming increasingly unavoidable and the public are making greater use of the countryside for recreation.

3. Potential consequences of selection for behavioural traits on maternal defensive aggressiveness

3.1. Consequences of selection for reduced flightiness during routine procedures

Behavioural traits are typically under the control of many genes and combinations of these genes may affect a number of traits (Buchenauer, 1999). Consequently, selection for one trait is likely to have concurrent effects on other traits. Le Neindre et al. (2002) have speculated that a link may exist in cattle between flightiness during routine husbandry tasks and maternal defensiveness. If this is the case, selection for reduced flightiness could result in correlated changes in maternal defensiveness. Thus suggestions (e.g. Boissy et al., 2005) that one of the positive consequences of selection for reduced fearfulness of cattle during routine handling could be a strengthening of maternal behaviour would need to discount the potential risk of also strengthening maternal defensive aggression.

Rodent studies can provide general indications of the wider consequences of selecting for reduced fearfulness on maternal defensive aggression. Maestripieri and D'Amato (1991) have demonstrated that female mice