

# Taming and Training of Pregnant Sheep and Goats and of Newborn Lambs, Kids and Calves before Experimentation

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**Summary** — Familiarity with handling and routine procedures reduces the stress experienced by pregnant ewes and nanny goats and newborn lambs, kids and calves during experimentation. The factors that need to be considered when taming and training pregnant ewes and goats include: the behavioural and physiological effects of daily handling for six to eight weeks; the impact of the progesterone/oestrogen status of ewes on their responses to taming and training; the attainment of physiological stability after surgery; and comparison of tamed and trained ewes with non-handled ewes. The factors that need to be considered for newborn lambs, kids and calves include: beneficial effects of the experimenter being part of the birth environment of lambs, kids and calves; the impact of handling on lamb responses to feeding and painful procedures; and remote sampling effects on physiological responses. The relative value of taming and training for the humane management of animals and for producing meaningful results is assessed with reference to absence of the confounding effects of stress, and, conversely, the possible confounding effects of taming and training, on the animals' responses.

**Key words:** *adults, newborns, recovery from surgery, sex steroid effects, stress reduction, taming, training.*

## Introduction

It is commonly observed that adult ruminants respond in an apparently stress-free way to familiar environments, handling and other benign procedures, and that wild, untamed or naïve animals do not. This suggests that such animals are amenable to taming and training and, in the experimental context, that familiarising them with the laboratory, personnel and non-noxious routine procedures may be advantageous. This proposition is explored in the present paper.

## Responses of Pregnant Sheep and Goats

My interest in taming and training animals before experimentation dates back at least 30 years. I was then studying prenatal factors that cause death or debility in newborn lambs using new methods that allowed physiological responses to be monitored in individual fetuses throughout the last 40–60% of pregnancy (1, 2). The sheep were brought directly into the laboratory from a farm. They were not familiar either with the indoor environment or handling, were excitable and some were obviously stressed by the experience. As a major purpose of the work was to study fetal development and responses in conscious and *unstressed* pregnant ewes (3, 4), we introduced daily taming and training of every sheep for six to eight weeks before we surgically inserted the uterine and fetal catheters that allowed intensive observations to begin. The taming and training consisted of staff spending 10 to 15

minutes each day gentling, stroking and quietly talking to the animals, while holding them in the part of the pen where they would subsequently be required to stand for sampling from catheters. The effectiveness of the taming and training was judged by the replacement of aggressive, escape and excitable behaviour with calm, relaxed and even positive responses to benign handling. We showed subsequently that these behavioural changes were paralleled by the disappearance of physiological stress responses (elevations in heart rates and plasma cortisol concentrations) during handling and repeated jugular venepuncture (5), thereby confirming that we were working with unstressed pregnant sheep. Pregnant goats responded to taming and training in a similar manner (5). All the pregnant animals studied by us during a 12-year period were prepared in this way (6, 7). Subsequently, in another laboratory, gentling of wethers was also shown to reduce their heart rates, flight distances and aversion responses to handling (8).

Taming and training had other advantages. It allowed the health of the animals to be regularly and easily assessed, and their nutrition to be monitored and maintained at required levels. The nutritional management included feeding the animals daily rations in amounts that kept their plasma glucose concentrations within predetermined narrow ranges, an approach that achieved strikingly uniform nutritional states within and between the animals (9). The success of this relied on the animals being in a stress-free state, so that complicating effects of stress hormone release on plasma glucose concentrations were avoided.

## Sex Steroid Status and Responses to Handling

It is noteworthy that the sex steroid status of ewes apparently affects their behavioural responses to handling and to newborn lambs. First, mid-pregnant ewes that have high circulating progesterone concentrations and low oestrogen levels (10) become tame more rapidly than do concurrently handled barren ewes with very low progesterone and oestrogen levels (5, 11; D.J. Mellor, unpublished observations). Second, barren ewes injected with oestradiol and progesterone nuzzle and lick each other and facilitate handling of the udder by postural changes, whereas ewes treated with progesterone plus cortisol are aggressive to others and vigorously resist attempts to touch their udders (11). Third, high circulating oestradiol and progesterone concentrations combined with cervico-vaginal stimulation are major physiological triggers to the onset of mothering behaviour and successful ewe-lamb bonding at birth (11–13). These observations suggest that the reproductive state of the animal may affect the period required for taming and training to be effective. However, it is well known that after thorough familiarisation, most non-pregnant female or castrated male sheep, goats and cattle respond benignly to handling and to previously novel environments (8, 14–17).

## Recovery from Surgical Preparation for Experimentation

At least 25 years ago, we demonstrated in sheep and goats (3, 4, 6, 7, 9, 18–21), by using mobility, feed intake, feeding pattern and plasma corticosteroid concentrations as indices, that laparotomy plus uterine and fetal surgery cause significant but decreasing pain for about three to four days. We also demonstrated, by using plasma concentrations of glucose, urea and 21 amino acids as indices, that metabolic disruptions associated with pre-operative starvation, surgical stress and post-operative disturbances to feed intake and feeding pattern last for up to about 14 days after surgery. In those days, post-operative pain relief was not given routinely, and substantial advances have since been made in the management of such pain (22). It is not known whether successfully reducing post-operative pain with analgesia would have accelerated the return to normal feed intakes and feeding patterns, and would thereby have reduced the period required for metabolic stability to return. However, prior taming and training by the laboratory personnel would have helped to ensure that their presence post-operatively would not have added to the stress the animals may have experienced post-operatively.

## Lambs, Kids and Calves

Those experienced with intensively managing newborn lambs, kids and calves, whether on farms or in the laboratory, know that, provided the animals are treated benignly, they readily accept handling and other procedures with few if any signs of stress (17, 23–27). Indeed, such newborns appear to seek human contact. This is especially the case when the personnel are part of the environment of these newborns from soon after birth, and may be due to a reduction in fear of stockhandlers (25), a conditioning response to feed rewards (28), or an attachment response to stockhandlers (29). Lambs are able to discriminate between different stockhandlers (30), and human contact, particularly stroking and feeding, strongly influences attachment responses of lambs and kids to stockhandlers (17, 23, 24, 26). Likewise, feeding, stroking and talking to calves, especially during the first four days after birth, increase their motivation to approach, and be approached by, familiar and unfamiliar personnel (25, 27). These effects persist while benign contact continues and for some time after such contact ceases, but wane eventually. However, experience with adult animals (5, 8, 16) indicates that stress-free interactions can be reinstated with further intensive periods of taming and training, and it is noteworthy that such subsequent taming and training usually takes less time to be effective (D.J. Mellor, unpublished data).

## Taming and Training Alters Animals' Responses

Despite such benefits in an experimental context, one disadvantage is that prior taming and training of animals can change their responses to the stimuli they encounter in their usual environment. If their natural state is of interest, taming and training could modify the results. For instance, the cortisol distress responses are similar in lambs subjected to unfamiliar handling plus venepuncture and to tail-docking by using constrictive rubber rings (31), but when lambs are accustomed to handling and people, the distress response to handling plus venepuncture is less than the response to ring tail-docking (32).

These observations raise the issue of the extent to which direct handling plus venepuncture of untamed animals complicate the interpretation of results. There are clearly some effects, but not invariably so, since the magnitude of the cortisol response to surgical castration plus tail docking is not apparently affected by repeated handling plus venepuncture (33). However, untamed lambs, kids and calves appear to adapt rapidly to repeated venepuncture, because the transient rise in plasma cortisol concentration elicited by the onset of unfa-

miliar handling plus venepuncture soon passes, with subsequent plasma concentrations remaining at low levels for up to 24 hours (34). Nevertheless, when blood samples are taken remotely via indwelling catheters, the cortisol concentrations are lower (35), suggesting, not surprisingly, that the lowest concentrations seen with repeated venepuncture in untamed animals are not basal. This raises the question of whether small concentration differences such as these are physiologically significant. Some evidence from another area of livestock research, involving responses of pigs to rigorous or gentle handling (36, 37), suggests that they are. This work also emphasises that there are both welfare and production benefits when farm animals, in particular cattle, pigs and poultry (37), are treated benignly, and that such benign handling can be expected to minimise stress during laboratory use of farm ruminants.

## Conclusions

It is evident that taming, training and benign handling before and during an experiment can beneficially modify the behaviour and physiology of excitable, naïve animals, thereby helping them to adjust to the laboratory. However, particularly fearful individuals or semi-domesticated or wild species may be less responsive to taming. In more tractable, nearly tame animals, subtle effects may be present, but these can also be minimised by caring attention and benign handling. However, all such treatment of animals changes them, which could be a disadvantage if their untamed responses are of interest. So-called "hands-off" approaches, which enable remote monitoring and preferably also involve minimal invasiveness, are therefore worth considering (38).

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