

Flocks and Herds or Flerds - the choice is yours

Rangelands are characterized by many different kinds of plants. Therefore, profitable and ecologically sound stewardship of these landscapes must involve reasonable methods for turning range plants into food and fiber. Mixed-species stocking with domestic cattle, sheep and/or goats is one of the preferred methods. Mixed-species stocking tends to spread vegetation utilization across all plant life-forms (grasses, broad leaf and woody plants) since cattle prefer eating grass, sheep normally choose to graze forbs (weeds) while goats prefer browsing on twigs and leaves of many woody plants. Furthermore, with mixed-species stocking, animals tend to distribute themselves across a landscape in an attempt to satisfy their dietary preferences. However, the benefit of mixed-species stocking is frequently unrealized because the more vulnerable sheep and or goats (small ruminants) are the first species lost to predators. In the Western United States, coyotes (*Canis latrans*) are the major predators to small ruminants. For information on coyotes and their role as predators readers are referred to <http://www.canids.org/SPPACCTS/coyote.htm> and http://www.cws-scf.ec.gc.ca/hww-fap/hww-fap.cfm?ID_species=58&lang=e and for information on predation losses and how predators can be controlled check out <http://attra.ncat.org/attra-pub/predator.html>.

One approach to controlling coyote predation on sheep and goats involves altering the behavior of small ruminants so they consistently stay near cattle under free-ranging conditions and thus receive protection from canine predators. Would you consider implementing this behavioral based methodology developed on the Jornada Experimental Range (JER) operated by the United States Department of Agriculture Agricultural Research Service if

it had additional management benefits beyond protecting sheep and goats from coyotes? If you answer “yes,” **flerds** might be a management option to consider.

What is a Flerd?

Etymologically the word flerd is the contraction of **flock** and **herd** but more importantly a flerd is a mixed-species grouping of animals that consistently stay together under free-ranging conditions. This association offers management benefits not found when managing flocks and herds. In flerds, cattle, as group leaders, tolerate the close presence of the smaller ruminants initiated and maintained as a result of behavior modification. In smaller ruminants that have not had their behaviors modified groups of sheep and or goats stay together as a flock that is dissociated from cattle groups or herds.

The concept of creating flerds came from observing the reaction of cattle when worked by dogs trained to voice and hand signals. If a dog became too aggressive towards a cow, the cow would often stand its ground or retaliate by kicking or chasing the dog. This aggressive behavior on the part of cattle toward dogs made us ponder the following scenario. Because dogs and coyotes are both canines, if we could get small ruminants to consistently stay with cattle, would this close association offer the small, more vulnerable animals predator protection from coyotes?

Over a period of 14 years a number of studies were conducted on the JER to investigate how to modify small ruminant behavior, what challenges might be expected from modifying sheep and or goat behavior, and how this behavior modification might facilitate mixed-species stocking.

To evaluate if small ruminants were actually staying near to the cattle a Border collie dog trained to voice and hand signals was used. Numerous tests examined the response of foraging animals to the approach of controlled canine aggressiveness. The initial response was for foraging to cease and the group to coalesce into one or more dense groups that would attempt to run from the dog.

If the group was not a flerd, the animals would immediately split into intraspecific groups. Cattle were normally the first animals to stop running, and turn to face the dog. The small ruminants, now separated from cattle, would usually continue to run. Often one or more of the small ruminants on the perimeter of the group would become separated, and these lone animals became the focus of the dog's pursuit. At this point the dog was called back by its handler, thus ending the test. Had the pursuing canine been a coyote, most likely the isolated sheep and or goat would have been the first animal to die.

In contrast, if the group was a flerd, only a single group of animals was observed running away from the pursuing dog. Cattle were normally the first species to stop running followed immediately by the small ruminants. The cattle in attempting to keep the dog in sight at all times would form a circle facing outward. Within this configuration, the sheep and or goats would appear between pairs of cattle. At this point, the test ended and the dog was called back by its handler. To get from flocks and herds to flerds requires a process termed bonding.

What is bonding?

We define bonding (or cross-specific attachment formation, as it is referred to in scientific literature) as the process by which sheep and or goat behavior is modified such that animals consistently associate with cattle under free-ranging conditions rather than form intraspecific flocks that normally

remain separated from cattle herds. Bonded small ruminants consistently remain within line-of-sight of one or more cattle at all times. Bonding occurs regardless of the number of groups of cattle because the bond forms at a species level rather than with individual cows. If this were not the case bonding would have little practical value for a producer and loss of individual cows would result in a break up of the flerd.

The bond appears to be unidirectional, i.e., cattle appear to tolerate the presence of small ruminants but do not appear to have their behaviors modified. Once small ruminants are bonded, all that is required for a flerd to develop is cattle tolerant to small ruminants.

How do you create bonded animals and eventually a flerd?

Bonding is a time sensitive process requiring a close association of small ruminants with cattle during which time their behavior is modified to prefer to associate with cattle even when given the opportunity to separate from them. The first published study on bonding Rambouillet- Polypay crossbred sheep to cattle began in 1985. Lambs 45, 62 and 90 days of age that had been weaned at 45 and 62 days of age were placed with 8 to 9.5 month-old heifers for a period of 60 days in pens having solid sides. Following 30 and 60 days of pen confinement, lamb heifer pairs and groups consisting of seven lambs and six heifers were taken to a remote location, placed in a corral, allowed a few minutes to become accustomed to their new environment, and then released into a paddock and observed for eight consecutive hours. Three estimates of aggregation or dispersion were recorded every 15 minutes; the diameter of the smallest circle enclosing each species together with the shortest distance between the perimeters of these two circles. Following 30 days of pen confinement the 45 and 90 day old lambs remained five times closer to cattle compared to control lambs that had not seen cattle before the eight hour field testing was

conducted. From these data we concluded that 30 days of pen confinement were sufficient to bond 45 and 90 day old lambs to cattle. In addition, separation between the 62-day-old lambs and the heifers was much greater than the separation observed for the 45 and 90 day-old lambs. This unexpected finding was eventually traced to a physically abusive heifer that would kick and butt the lambs when they approached the feeder. It was only evident during the feeding of hay to the penned animals. Based on these observations, a study was designed in which 75-day-old lambs were confined with abusive and non-abusive heifers for 55 days. Bonding was evident following 20 days of pen confinement in the treatment composed of non-abusive cattle. However, bonding did not occur in the pen of lambs with abusive heifers. Physical abusiveness in pen confined animals appears to be most prevalent during feeding. If bonding does not occur during pen confinement there may be a problem due to one or more abusive animals that should be removed from the group.

In 1987, an attempt was made to bond 5-month-old mohair kid goats to cattle with and without bonded sheep. Two groups, each containing seven kid goats and three gentle cattle were penned together for 60 days. An additional 14 days of pen confinement occurred when previously pen-bonded sheep were added to half of the kid goats; the remaining seven cattle-exposed kids were put in pens having only cattle. Following 74 days of pen confinement, a short-term (four consecutive hour) field test to evaluate dispersion or aggregation was conducted on these two groups plus a group of six mohair kids and six lambs that had no previous exposure to cattle. During this test, cattle-exposed kid goats remained less than 30 meters from cattle while the non cattle-exposed kids and lambs were separated from cattle by 30 meters more than 60 percent of the time. A 21-day field test was then conducted. Only the group consisting of cattle-exposed kid goats together with

bonded sheep avoided serious death loss from coyotes (only the smallest kid goat was lost). The mohair kid goats that had been with only cattle and not sheep had only one kid goat remain unharmed. Losses by this group of kid goats that were previously bonded to cattle were similar to losses from the non cattle-exposed control group in which all the mohair kids and one lamb was either found missing or dead within 10 days after the field test began. These results suggest that bonding of mohair kid goats to cattle did not produce as enduring a bond as that formed between sheep and cattle. However, the weaker bond of the mohair kid goats to cattle was strengthened as a result of the affinity formed between the kid goats and sheep that developed during the 14 days of socialization preceding the 21-day field test.

Two years later, we evaluated aggregation or separation between Spanish (meat type) kid goats, lambs and cattle in a five hour field test following 30 days and again following 60 days of pen confinement. The Spanish kid goats ranging in age between 45 and 100 days-of-age and lambs between 41 and 105 days-of-age were penned with 8 to 10 month-old heifers for 60 days. The Spanish kid goats and the lambs had similar affinities for cattle over a 5-consecutive-day test in which no physical separations among animals were observed. However, as the bonded Spanish kid goats matured, they demonstrated a greater degree of independence from cattle than did bonded lambs, and were often found separated from the cattle-sheep group. Thus Spanish goats do not appear to have as enduring a bond to cattle as do sheep. Furthermore, Spanish goats do not appear to form bonds with the sheep as did the mohair goats. Thus Spanish goats may offer significant management challenges when part of a flierd.

In 1999 we demonstrated that bonds can form between yearling ewes and cattle regardless of the cattle age (eight months to 8 years-of-age) in as little as 14 days. Earlier studies suggested that lambs will associate with

cattle within 24 hours following birth, and some bonding may be seen as early as seven days after beginning pen confinement.

An alternative to pen-bonding is to create bonded animals by addition to an existing flerd in the field. In November 2001, 37 lambs approximately 9-months-of-age (36 females and one wether, a castrated male sheep) were gradually added to an existing flerd of 17 ewes, 13 mature beef cattle and five replacement heifers. Lambs were added to the flerd at a number and rate based on their demonstrating a preference to remain close (cohesiveness) to the core flerd. The first addition to the existing flerd was a single lamb. The next additions involved pairs of lambs added seven, eight and six days later, respectively. A group of three lambs was then added seven days later followed by a 21-day period during which time no lambs were added (Christmas-New Years Holiday). The next addition began on January 7, 2002, with the addition of four lambs followed by a three-day period of observation when three additional lambs were added. In the next two additions, two groups, each consisting of four lambs, were added four and three days apart, respectively. Five days later, six lambs were added and the final group of six lambs was added six days later on January 28. Although this study was not replicated, our results suggest the art involved in expanding the size of a flerd using field-bonding is based on individual lamb behavior as it affects the rate at which lambs could be added to the core flerd and have cohesiveness maintained.

Line-of-sight to the flerd cattle was never observed to be broken between the 37 lambs throughout the 71 day period. Over the following 366 days, only two of the original 37 lambs were lost, presumably to coyote predation, while none of the mature sheep were lost. In addition to the cattle and bonded sheep, Turkish Akbash guard dogs provided additional predator protection to the bonded sheep. This minimal death loss is in contrast to March and August 1986 on the JER where non-bonded sheep were lost at the

rate of one every five days, presumably from coyote predation.

Prior to development of flerds we relied on gunning, trapping, snares, electrified fences and guarding dogs to protect sheep and goats from coyote predation. We now use flerds in combination with Turkish Akbash guard dogs. However, guard dog management offers its own set of husbandry challenges. For example, if sheep and goats break into more sub-flocks than there are guard dogs some sub-flocks will be unprotected. Furthermore, if dogs are not spayed or castrated, their reproductive cycle can cause them to periodically leave the small ruminants unprotected while searching for a mate to satisfy their physiological drives. For additional information on predator protection tools and techniques the reader is referred to:

http://www.wildlifemanagement.info/publications/predators_7.pdf and <http://www.ext.colostate.edu/pubs/livestk/01218.html>

What are the benefits in managing flerds?

Based on our research, the consistent close association of small ruminants with cattle provides predator protection from coyotes in addition to providing other time and money saving management benefits including: **1)** Time required to locate small ruminants on a rangeland landscape is reduced because these smaller animals (sheep and goats) are always in the presence of cattle. This can be especially important in paddocks with dense woody plant cover (brush) or during foggy or snowy weather when the taller cattle are much easier to locate than the smaller animals. **2)** Because sheep and or goats in a flerd are always with cattle, internal fencing adequate to control cattle will also control the location of the smaller animals. Read the 2004 issue of Grass Roots Vol. 4(1):10-13 (<http://www.gssa.co.za>) to understand how this characteristic of flerds could fit into managing livestock using Directional Virtual Fencing (DVF™). **3)** Cattle tend to range

over more area when foraging than do sheep and or goats. Therefore, flocks distribute foraging over a larger area of the paddock than possible with flocks and herds.

Practical suggestions when attempting to form bonds and maintain flocks

In General

Every time you work with animals, you are training them. Strive to make the training an experience that will allow you to reach your management goals in the most time efficient and cost effective way possible.

Bond strength:

Bonding results from close associations. Bond strength (the enduring association of small ruminants to be with cattle) appears to increase as the length of time small ruminants are in contact with cattle. However, bond strength does not refer to the actual physical distance of separation between cattle and the smaller animals. In fact, the actual distance between cattle and bonded small ruminants may increase with “bond maturity.”

Though sheep and or goats tend to maximize their separation from cattle as bonds mature, even in mature flocks there is seldom line-of-sight separation between small ruminants and cattle.

Separation time:

Previously bonded small ruminants can be separated from cattle for up to two months, such as during dry-lot lambing, yet their association with cattle reestablishes after being reunited. However, the rule in managing flocks should be to never separate bonded small ruminants from cattle for longer than is necessary, and whenever separation of the small ruminants from cattle is observed under free-ranging conditions the flock configuration should be reestablished immediately. Animals that have separated should be observed for cohesiveness for several days after they are returned to the flock. If they stay with the flock nothing additional needs to be done, however, if

separations continue, on the third separation remove them permanently from the flock. This is rarely necessary since sheep and goats are gregarious and normally stay with peers. Many of these peers will have developed strong bonds to cattle.

Paddock selection:

Dietary preferences for free-ranging cattle, sheep and or goats are not significantly altered by flocks. However, vegetation patterns across rangeland landscapes should be considered if given a choice in where to manage a flock. A heterogeneous vegetation pattern without distinguishable patches would be preferred to a vegetation mosaic of large patches each containing only a single plant life-form. This later vegetation pattern could cause the flock to split apart during foraging in order for each animal species to optimize its dietary preferences.

Because bonds are species-specific, it is essential that the paddock in which a flock is located not be surrounded by livestock. If this were to occur, the small ruminants may attempt to follow livestock in adjoining paddocks if the fence is not sheep and or goat proof.

The first paddock in which the group of newly bonded animals is placed should be relatively flat, brush free and with only one drinking water site available at any time. The physical size and shape of the paddock should allow line-of-sight among all animals at all times. Once the flock has “matured” to a field routine, it can be successfully managed in brush infested paddocks or those with undulating topography.

Pen-bonding

Pen-bonding is probably most suited for bonding lambs and kid goats to cattle. Several points should be considered when confining animals in pens in an attempt to eventually form flocks. **1)** Use sheep and goat breeds that exhibit flocking tendencies (white face sheep breeds may make better

candidates for bonding compared to black face breeds based on flocking tendencies). **2)** Select the youngest age and most docile sheep or goats that will easily fit into the management program. The ages of sheep used in the JER studies ranged between 45 days of age to 18 months. **3)** Select only docile cattle of any age and always use at least two cattle per pen to minimize their anxiety due to their being separation from peers. **4)** If physical abusiveness towards the lambs or kids is detected, remove the abusive animals immediately. **5)** Opt for the longest period of pen confinement that is economically and logistically possible to create the strongest bonds. Bonds have been observed with periods of pen confinement lasting between 14 and 80 days, however, a period of between 30 and 50 days of uninterrupted pen confinement is required to produce an enduring bond. **6)** Rectangular or triangular pens have successfully been used to create bonds with the area per animal ranging from 4.8 m² per animal to 17.5 m² per animal and the ratio of cattle to small ruminants ranging from 1:3 to 1:1, respectively. **7)** Pens with open vs. closed sides do not appear to affect bond formation. However, a pen area that is quiet with minimal activity is preferred. **8)** A creep area should be provided in each pen to allow the small ruminants a place to escape if threatened. The creep also provides an ideal location for supplementing the small growing ruminants and a perfect interface at which to begin the process of bonding. During the first 24 to 72 hours, hay can be fed on either side of the creep to allow close visual contact among animals yet provide a physical boundary between the larger cattle and the small ruminants during the initial stages of socialization. **9)** Bells can be placed on cattle; this sound will become familiar to the sheep and may help orient them to stay with the cattle when the animals are released into paddocks. **10)** Try to combine pen bonding with ongoing management practices to make the process as economical and efficient as possible.

Field-bonding

Bonding animals while they are in a paddock (field-bonding) is probably most suited for bonding older sheep and goats to an existing core flerd. Because feed no longer needs to be supplied to animals in pens, this technique provides a relatively low-cost method for increasing the size of an existing flerd. Many of the suggestions involving the creation of bonds using pen confinement apply to field-bonding as well. However, there are several unique requirements to consider when attempting to bond sheep and or goats to cattle under field conditions. **1)** As in pen bonding, always choose the most docile cattle and small ruminants. Eating and drinking water together will begin the process of socialization. Therefore, pen small ruminants with gentle cattle for at least 24 hours before you begin to add them to an existing free-ranging core flerd. **2)** Docile cattle, irrespective of physiological state, age and breeding, provide sheep equal opportunity to bond and appear to provide equal protection from canine predators. **3)** Choose paddocks without steep slopes or dense brush that would limit line-of-sight. **4)** Never allow more than one drinking water site or mineral supplement site to be available at any one time. A single water site forces animals to periodically come together. **5)** Bonded wethers form a closer association to cattle than bonded ewes; therefore, using one or more wethers in the core flerd may help to form a more cohesive group than using only ewes. In addition, it may be advantageous to have the wether(s) and several cattle wear bells as part of a core flerd. **6)** If separation is observed, it is always preferred to move the animals that have separated from the flerd back to the flerd, never move the flerd to the separated animals. Returning these animals back to the flerd is best accomplished using a trained dog. The dog should be worked in a manner that will return the separated animals back to the flerd with an experience that will help them remember why they should not leave the flerd! **7)** As a rule of thumb, new animals should not be added to a core flerd until the most recent additions have been

observed to remain with the core flied for at least three to five consecutive days. **8)** Lambs born to bonded ewes, though tolerant of cattle, are not themselves automatically bonded. They must become socialized with cattle in order to consistently remain with them under free-ranging conditions. **9)** Sheep and or goats that rapidly form close and enduring bonds will assist other animals that do not form cohesive bonds due to their gregarious nature. Therefore, all small ruminants should be given the opportunity to become bonded. **10)** As with pen bonding, use the youngest age of small ruminant to begin the bonding process and use paddocks having the highest quality and quantity of feed for growing animals.

Conclusions

Bonding forms the base of a behaviorally based tool that can facilitate management of mixed-species stocking groups. Forming bonds requires physical association between small ruminants with cattle that changes the orientation of these sheep and or goats when together with cattle under free-ranging conditions. This bonding can be

accomplished either through pen or field techniques. Husbandry skills involving a keen sense of observation and patience coupled with innovative and pro-active management choices are required to create bonded animals and maintain flieds.

Managing flieds offers a producer several tangible benefits including a reduction in sheep and goat predation losses from canine predators. As a result of the close and consistent association of small ruminants with cattle, the amount of time spent in locating livestock under free-ranging conditions can be reduced. Fencing adequate to control cattle will control small ruminants that have been bonded to cattle. Finally the consistent association of small ruminants with cattle will improve animal distribution over more of the landscape than if only flocks are managed.

For additional information on bonding and flieds please contact **Dean M. Anderson**; U. S. Department of Agriculture-Agricultural Research Service, Jornada Experimental Range; Las Cruces, New Mexico; U.S.A.; 88003-8003; deanders@nmsu.edu.

GSSA SOUVENIRS

To raise some funds for the GSSA, the Council organised some limited edition GSSA branded souvenirs to sell at the International Rangelands Congress held in Durban last year. For those of you who couldn't make it, now is your opportunity to get some for yourselves (and they make excellent gifts!!). All of the items are engraved with either the GSSA logo or one of Africa's "Big Five".

The sets of Schnapps Glasses or Glass Coasters are available with either all GSSA logos or with one GSSA logo and one each of the "Big Five". If you would like to order any of the items listed below, email admin@gssa.co.za, fax 033 390 3113 or phone Freyni on 083 256 7202. Postage is not included, but will be determined by how much is purchased.

DESCRIPTION

6 Schnapps glasses in wooden gift box

2 Whiskey glasses in wooden gift box

6 Glass coasters in wooden gift box

Stainless steel mugs (with GSSA logo and one of the "Big Five", or just GSSA logo, or just one of the "Big Five")

Stainless steel glasses (with GSSA logo and one of the "Big Five", or just GSSA logo, or just one of the "Big Five")

PRICE

R180.00

R130.00

R110.00

R25.00

R25.00