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Larkspur: Managing grazing to avoid poisoning cattle

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Poisoning of cattle by larkspur (*Delphinium* spp.) is common – perhaps the most common deadly poisonous plant problem – on Western U.S. rangelands. Poisoning usually occurs in spring on plains and foothill ranges in Wyoming and during summer on montane ranges.

The small stature larkspur species typical of plains and foothill rangelands are *D. geyeri, nuttallianum*, and *bicolor*. These species vary regionally around Wyoming in abundance and incidences of poisoning. Plains larkspur (*D. geyeri*) in Albany and Carbon counties of southeast Wyoming appears to be the most frequent problem. Tall larkspurs, *D. barbeyi* in southern Wyoming and *D. occidentale* in most of Wyoming, but less poisonous in southern Wyoming, occur in mountain regions generally receiving more than 20 inches annual precipitation.

Larkspurs contain alkaloids that block the nerve-muscle junction. With an acute dose, animals will begin trembling, collapse, and rapidly die from respiratory failure. Bloat occurs rapidly from reduction in rumen motility and eructation (belching) and may be the cause of death if immediately acute doses were not consumed. Toxic concentrations vary geographically and among larkspur species. Effective dose of toxic alkaloids to cause signs of poisoning (trembling and weakness) is about 20 mg/kg body weight. If toxic concentration in the plant is 0.5 percent, a 1,000-pound cow would show signs after eating 4 pounds of plant dry weight or about 16 pounds fresh weight. Sheep appear to require about four times more larkspur toxin per unit body weight for toxicity to occur. Since the toxic amount of plant needed to kill a sheep is a high percent of their daily intake limit, they very seldom poison themselves by eating that much larkspur.

High concentrations of alkaloids in young plants of tall larkspur reduce palatability and limit consumption by cattle unless other forages are limited. Alkaloid concentrations decline as tall larkspurs mature. They become more palatable and more likely to be consumed. This creates a toxic window after flower buds form when cattle should not be exposed to tall larkspur. After seed pod maturity, toxin concentrations decline to the point consumption is less of a potential problem. Plains larkspur apparently does not vary as much in toxicity or palatability. The high forage quality of young larkspur, including the nutrients phosphorus and protein, and digestibility, increases the tendency of grazing animals to consume larkspurs.

Plains Larkspur

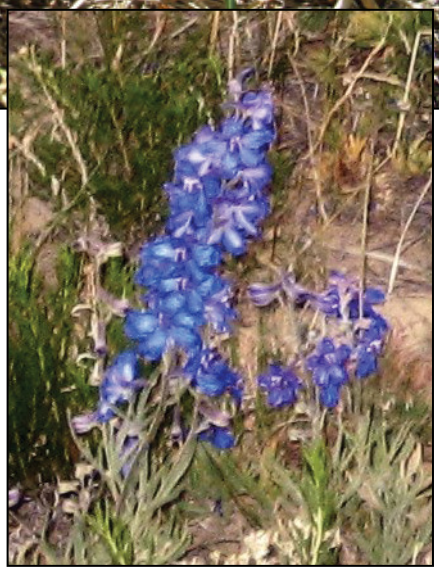
Customarily, cattle are turned out on plains or foothill rangeland after snowmelt. Unfortunately, low and plains larkspurs start earlier or grow faster than grasses creating

Plains Larkspur

a forage resource that may be widespread and relatively abundant at the time. Ranchers typically find poisoned animals after a few days of cattle being on spring rangeland where larkspur occurs. Consumption of larkspur can be hypothesized to start as other forages become depleted until a sufficient amount is consumed to cause symptoms. Cool, foggy, or showery weather has been observed to increase consumption. Sometimes, snow cover will limit the accessibility of grasses relative to larkspur creating a situation with even greater probability of consumption sufficient to kill.

So, what can be done to alleviate this problem? After decades, a few management suggestions have emerged. In any scenario, providing a mineral supplement high in phosphorus would be advantageous because it is beneficial to cattle productivity. Some producers believe supplemental phosphorus reduces the attractiveness of plains larkspur as a phosphorus source although this has not been confirmed with controlled experiments. Protein and digestibility of forages are usually not nutritionally limiting at this time. Some ranches have used sheep grazing prior to introduction of cattle to reduce opportunity for larkspur consumption.

Solutions with cattle grazing should involve increasing the amount of grass available compared to larkspur by waiting until more growth has occurred and/or reducing the opportunity to consume lethal amounts of larkspur. Some producers found that turning cattle out into a pasture rested the previous year and with previous year's standing crop of vegetation remaining limited consumption of larkspur. The animals presumably would have had difficulty grazing larkspur without consuming sufficient mature and new growth grass to dilute the larkspur. Cattle could still be selective enough to graze larkspur especially if the grazing period extended and grazing exposed more larkspur plants or increased the proportion of larkspur available.



Plains Larkspur

Ensuring adequate alternative forage appears beneficial in limiting larkspur poisoning. Examples of successful programs have 1) moved animals frequently based on

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residual forage to new pasture so adequate grass is available to limit shifting diet to larkspur and/or 2) having a high stock density so few or no animals had the opportunity to over consume any relatively lesser abundant vegetation component such as larkspur. Higher stock density should force grazing animals to be more competitive in seeking forage and to have less opportunity to consume higher quality forages. Even if larkspur is consumed, the number of animals in a high density situation might limit the amount of larkspur any one animal could consume assuming adequate residual forage amounts are retained. A caution is that too much larkspur or too few animals could result in dangerous larkspur consumption.

A case study on the Laramie plains can be used to illustrate how grazing management alleviated cattle poisoning from larkspur – a subsidiary benefit of the grazing system to improving range productivity and cattle production. Significant reduction of plains larkspur was believed to have been achieved by manipulating stock density, rest/recovery period, and timing of grazing, although weather over the decades could have had some influence. An intensive management program for improved cattle production and range condition was implemented. Pasture size was reduced to 320 acres or less and cow/calf numbers increased. Forty-eight upland pastures are utilized to accomplish the goal of 50 percent forage removal in the shortest amount of time possible. Depending on pasture sizes, this was achieved in about three days when high intensity/short duration grazing was implemented and has since grown to six to nine days after implementing a minimum full year of rest between grazing events. This scenario creates a stock density of approximately 1.2 pairs per acre, although this is sometimes doubled by using temporary electric fence. By increasing stock density, competition for forage has presumed to increase, and, if so forcing every cow to consume a small amount of a wide variety of plants, including larkspur. This stock density may ensure that no single animal receives a toxic dose of larkspur and a higher frequency of undesirable plants are clipped off or trampled thus reducing their ability to reproduce.

Plant composition improved and there was less bare ground and less forbs apparently resulting from higher stock densities. Higher stock densities increase hoof action, break-down of organic material, and improve water retention and nutrient cycling. Associated effects are a longer rest/recovery period. Rest/recovery time varies between 400 and 800 days depending on where a given pasture falls in the rotation. This period helps create more litter and gives desirable plants sufficient time to fully recover from grazing pressure. Variation of the time of year of the grazing event has helped increase other species and reduce larkspur infestations. Grazing pastures while larkspur is most succulent will reduce the plants reproductive ability but also reduces vigor of desirable plants. By rotating the time of year that grazing events occur in an individual pasture, pressure is reduced on larkspur, but diversity of plants is encouraged in the entire pasture and more species to compete for root space and reducing bare ground are created.

Larkspur infestations in some pastures have been reduced from moderate to very low infestations. Likewise, death loss from larkspur has become a thing of the past on the majority of the ranch. Unfortunately, there are still pastures that, due to livestock water and other restrictions, remain too large to achieve the results above so losses do occur. These pastures are roughly 1,280 acres and grazing

Plains Larkspur

events occur for 14 to 20 days with 350 to 400 pairs. This is a stock density of about 1 cow to 3.4 acres creating opportunities for over consumption by individual cattle while not affecting the larkspur and less rest with a lack of hoof action resulting in poor water and nutrient cycling.

Tall Larkspur

Tall larkspur has been studied extensively by the scientists with the Poisonous Plants Lab in Logan, Utah (USDA-ARS). They have found patterns in the toxicity and palatability of tall larkspur that provide the opportunity for a predictable grazing program on montane rangelands that will limit poisoning deaths in cattle. When tall larkspur begins growth until near flowering when flower stalks elongate, toxicity is high but palatability is low. This is a period of low risk grazing. Toxicity drops while palatability increases so that consumption may increase sufficiently to cause death in cattle after flower stalks elongate. This toxic window remains until after flowering when the flowers are replaced with seed pods and toxic concentrations are low enough to generally limit cattle deaths. Interestingly, tall larkspur consumption may be very low during drought conditions or may be extremely high after an afternoon thunderstorm.

Less obvious relationships between toxicity and palatability are evident with low stature larkspurs as they may be eaten before or after flowering. After flowering consumption of plains larkspur is generally low presumably because other forages are abundant. Avoiding poisoning of cattle by larkspurs requires recognizing the presence of the plants and planning ahead with a grazing program that minimizes opportunities for poisoning.

Tall Larkspur

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