

spp. and *Danthonia* spp.) in the understory. While much of the vegetation could be classified as rangeland, the successfulness of pasture improvement programs means that pastures are managed on an agronomic, rather than an ecological basis. Although highly productive in the climax state (2 sheep per acre), the sowing of perennial ryegrass, cocksfoot and white clover coupled with phosphatic fertilization has doubled the potential carrying capacity.

Since aerial sowing on lands too steep to cultivate has proven as successful as conventional methods, the High Rainfall zone has increased in importance as a sheep-producing zone. While wool production has remained relatively constant, the increase

from 49 million sheep in 1959 to over 65 million in 1970 (40% of Australia's flock) reflects the increase in lamb production, particularly in New South Wales and Victoria.

As in the Wheat-Sheep, land ownership is mainly private although property size is smaller than the cropping areas, averaging about 1,500 acres. However, with pasture improvement and sophisticated management, reproductive performance liveweight gains and wool growth exceed those of the Wheat-Sheep zone. In addition, since sheep production generates the entire ranch income, the average flock size of 2,000 ewes is greater than that of the Wheat-Sheep zone with their dual income. ●

From Sagebrush to Alfalfa

Gene Handl and Dave Heilig

Two tough winters in a row proved the soundness of the decision by Freddie Berzel to convert sagebrush flats to productive alfalfa hayland. "The last couple of winters a person just about had to have his own hay," said Berzel, who ranches ten miles south of Ismay in Fallon County in southeastern Montana. "If I hadn't had the new hay meadows, I would have had to reduce my herd."

The story begins back in 1967 when Freddie and wife, Dixie, purchased a 12,000-acre ranch on O'Fallon Creek. "We had two major problems", Berzel said. "We lacked a hay base and cross fences." Previously, the ranch had been used as a range sheep operation. "We saw the need to control our grazing because cattle naturally like to hang along the creek. The bottoms were badly abused and the outlying areas unused."

Because they were starting from scratch, Freddie and Dixie sought assistance to improve their operation. They joined the Little Beaver Conservation District and applied for technical and financial assistance. The Soil Conservation Service furnished technical help while financial assistance came from the Great Plains Conservation Program and the Agricultural Conservation Program.

First, the Berzels built 8 miles of cross-fence and five artesian wells; then, they started planning for more hay production. A 1973 ranch resources inventory showed 60 acres of hayland producing less than 2 tons per acre. The straw from 400 acres of cropland was used to supplement this meager hay supply.

It was decided that 150 acres of sagebrush flats along O'Fallon Creek could be developed for hay using a modified water-spreading irrigation system. The system, developed in 1974, is made up of a series of 2- to 3-foot dikes placed on contour with weir boxes for water control.

To continue with the project Berzel worked out an agreement with his neighbor to build a control structure on an existing dam on Spring Creek to divert excess spring run-off into his dike system. This resulted in the development of 125 acres of water-spreading, which included two elevated ditches, a pump site in O'Fallon Creek, and a control structure on the diversion dam.

This is a unique system in that it offers two options for flooding most of the fields. The first option is to flood the whole system by diverting the water from Spring Creek into a level elevated ditch and a normal grade canal in combination.

The other option is to reverse the flow by pumping from O'Fallon Creek into the level ditch. This option floods the lower fields in the system. The system works automatically by allowing water to flow from one dike to another as each fills to the level of the weir boxes. The major share of the water flows through the weir boxes.

The flooded area behind each dike is designed to have an average water depth of 1 foot. At times of peak flow, emergency spillways at the end of each dike handle the excess water. These spillways provide protection to the system from excessively large amounts of water.

The diked area was seeded to a mixture of 5 pounds per acre Vernal alfalfa and 2 pounds per acre pubescent wheatgrass. "Production was over 3 tons hay per acre in one cutting last year", Berzel said. He had planned to get two cuttings, but the latter part of the season was dry so he decided to try for a seed crop instead. The result was about 60 pounds bulk alfalfa seed per acre. "Something I hadn't planned on," he said. "Nice to get an added check in the fall." Normally he takes two cuttings of hay.

"The water-spreading system played a critical role in the development of this unit," said Berzel. "It decreased my

The authors are range conservationists for the Soil Conservation Service in Montana.



Sagebrush area on the Freddie Berzel ranch south of Ismay, Montana, before he installed a waterspreading system. (SCS photo by Handl)



In 1978, the former sagebrush area yielded 3 tons per acre of alfalfa hay. The waterspreading system helped provide the Berzel ranch a much-needed hay base. (SCS photo by Handl)



Freddie Berzel stands by one of his spring-fed wooden livestock water tanks. He developed several springs to get better grazing distribution. (SCS photo by Handl)

wintering costs and made me a more balanced unit." Berzel feels that a ranch can have too much hay. "It costs too much to put up excess hay. Often it ends up being poor quality if it isn't put up on time," he notes. "A ranch should have enough hay to provide a good balance between grazing and winter feeding." "Also," said Berzel, "the silver sagebrush flats have a value for mule deer and winter grazing too."

In addition to developing his hayland, Berzel seeded his cropland to grass. "We seeded a mixture of 5 pounds Nordan crested wheatgrass and one pound Ladak alfalfa per acre. We use this in the spring to allow our native range a chance to get a start," he said.

Last year they grazed their crested wheatgrass from the middle of April until the first of June. Because of good moisture, they were able to cut hay in excess of one ton per acre and still

get some fall grazing. "I wouldn't expect this kind of production in a normal year," says Freddie. "Last year was exceptional."

Other practices that have been applied include the development of two springs in 1974, building 3 more miles of cross-fencing in 1975, and constructing a livestock water pipeline in 1976 and a stockwater dam in 1977. Then, in 1978 Berzel started to rotate his native pastures to allow them a rest during the growing season every other year. After only 1 year of operation, he said, "I can see that the grazing system is going to make a lot of difference. I've averaged 70 extra pounds in weaning weight." (Weighing is done on his own certified scales.) He attributes this increase mainly to his early spring grazing on crested wheatgrass pasture and better quality cattle.

Cottonwoods, chokecherry, Nanking cherry, western sand cherry, Russian olive, Siberian elm, and ponderosa pine were planted in 1975 as a windbreak to cut down on wind around headquarters. Of this Berzel remarked, "A shelterbreak takes a lot of care in the early years. Many of the Russian olives were broken off by the wind. They had to be pruned so badly that they looked like sticks. The next year they looked really good." Then he joked, "Now the shelterbelt is doing great. I think I'll have to prune them." Dixie has this to say about the shelterbelt, "The sand cherry has a lot of good fruit. This summer we expect the Nanking cherry to have fruit."

"Right now I've got the water distributed pretty well through the place so the grazing system is really working well. My future plans include a couple of wells and perhaps seeding additional tame pasture," said Berzel.

His herd consists of Angus cows bred to Hereford bulls. Often he said, "I think the beef industry has a pretty good future if left alone. My goals are to maintain a good quality cow herd by proper culling and continued improvement of my cross-breeding program. I'd like to be able to run a sound economic unit and the practices that I have installed have provided me a sound base."

Finally, Berzel said, "I could not have developed this ranch without the Great Plains Program. This is a good program for starting ranchers. I think now that I can handle any additional developments with my own resources."

Range Management Specialists for Overseas Technical Assistance Programs

Experienced in design—development/implementation—evaluation.

Short and/or long-term consultant fee positions. Overseas experience and/or foreign language desired. Salaries open. Excellent benefits. Address responses to:

J. Fiester
Chemonics International Consulting Division
1120 19th Street NW, Suite 605
Washington, D.C. 20036