Agricultural Experiment Station
Oregon State University
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Eastern Oregon Agricultural Research Center Union Station Centennial Celebration

"It is true that many experiments may be failures, while another may be a success. Where it is a failure, it falls lightly upon all, but it would ruin an individual; if it is a success, all receive and participate in its benefits."

J.K. Weatherford, President, Board of Regents, O.A.C.
In 1906 Annual Report of the Oregon Agricultural College Experiment Station
to Governor George E. Chamberlain

Acknowledgments

The authors would like to acknowledge the numerous students, farm and ranch hands, volunteer advisory members, and academic professionals who have worked at the Union Station over the past 100 years. It has been their hard work and dedication that has kept the Station going during the good times, as well as the bad. Appreciation also is expressed to the determination and dedication of the community for taking the initiative to establish, and then stand behind, the Station during the hard times.

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100 Years of Agricultural Research

Eastern Oregon Agricultural Research Center Union Station

Vance Pumphrey, Tim DelCurto, and Martin Vavra

I. Introduction

In the year 2001, the Union Station celebrates 100 years of service to the agricultural community. While this may seem like an insignificant event in the course of other activities and events, the Union Station was the first—and, thus, the start—of the Branch Station System of Oregon State University. Furthermore, the Branch Station System at Oregon State University is perhaps one of the best systems providing regional research and linking Extension outreach and applied science for the benefit of the agricultural industry and public. In fact, the Branch Station System at Oregon State University is one of the best of the Land Grant Universities in the United States.

In some ways, it is remarkable that the Oregon State University system started with the Union location. Over the past two decades, allocation of funds at the University level and changes in funding priorities have, at times, seriously threatened the future of the Union Station. As the Union Station specialized to become focused primarily on range livestock production, some questioned its usefulness. There was already range livestock research being conducted at the Northern Great Basin Experimental Range (formerly known as "the Squaw Butte Station") and on beef cattle ranches at the Campus location.

It is also remarkable how the Union Station has seemed to follow the same trajectory as the community of Union. Union was a thriving city at the turn of the century. It served as a major transportation hub of eastern Oregon and rivaled LaGrande for the Union County seat. However, like the Experiment Station, the community of Union was "by-passed," first by the railroad, and later by Interstate 84. These events seemed to seal a fate that has rendered Union a "bedroom community" of LaGrande.

Now, both the Union Station and community of Union have substantial reasons to look to a future of promise and optimism. The city of Union has made dramatic improvements in roads, built an 18-hole golf course, and reinvigorated a historic downtown area that is attracting tourists. For the Union Station, the 1999 legislature appropriated substantial funding to expand the operations and research programs by adding three additional scientist and three support staff positions. The funding allocation was due, in part, to recognition of the regional resources provided by the station, and the potential for research that addresses issues unique to the Northeast Oregon area. In addition, the success of the Oregon State University Agriculture Program at Eastern Oregon University and the integration of the Union Station Staff with the Agriculture Program suggest a promising future. In Chapter IV, the future staff and outlook are discussed in detail.

The history of the Union Station is also remarkable in that it mirrors the dramatic changes that have taken place in agriculture during the 20th century. In Chapter II, you can see a surprising range of research on crops and livestock. The early years in particular indicate that a diverse variety of crops, vegetables, orchards, and species of livestock were all a part of the research program. The early years mirror agriculture at

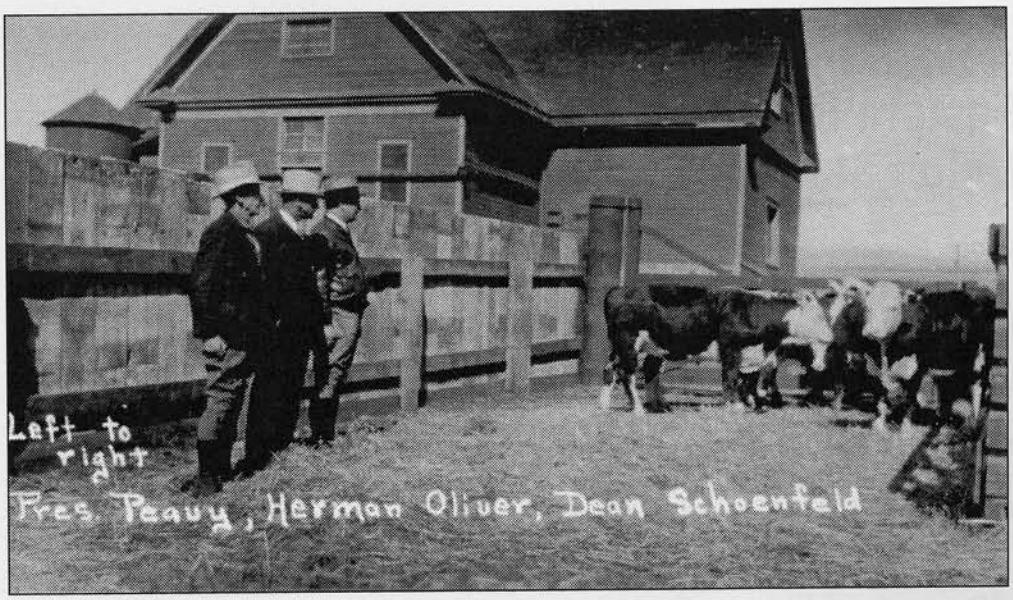

Figure 1. Cattle Feeders Day, 1934. President George W. Peavy, Herman Oliver, and Dean Schoenfeld.

the turn of the century, with diversified farms and ranches that served a regional agricultural industry and retail food industry. In the 1930s, 40s, and 50s, regional agriculture specialized dramatically. The development of refrigeration and advanced transportation systems forced regional agriculture to focus on crops and/or ranching systems that best fit their resources and advantages.

Information on the history of the Eastern Oregon Agricultural Research Center, Union Station, was obtained primarily from records in Union, Oregon archives at Oregon State University, Corvallis; the weekly newspaper published for many years in Union; and numerous people who worked at the Center. In addition, annual and biennial reports, experimental records, publications, and payroll data were most helpful.

Establishment, development, successes, and shortcomings are related. Broad categories of research and activities during the 20th century are summarized. Those interested in details beyond what are presented are welcome to review original materials and publications listed in Appendix 3.

The Center was fortunate and thankful for the cooperation and support of ranchers, farmers, and business. At times, the Center was one of the leaders in agricultural changes, which increased agricultural productivity, and at other times the Center was being led.

We hope you enjoy this publication as much as the authors have enjoyed preparing it for you.

II. The First 60 Years

Establishment

Governor Geer, in his annual message of January 1901, made suggestions for use of State-owned land near Union. One suggestion was, "It would be an act of justice and good policy to erect an agricultural college on the tract of land referred to".[1] The Governor also stated the land would make a good experiment station. The land had been purchased in 1894 for $25,000 following a provision of the 1893 legislature to build an asylum in eastern Oregon.[2] Subsequently, the Oregon Supreme Court ruled that State buildings could only be built in the State capital. By 1900, the legislature amended the State constitution to allow State buildings outside the capital.

A group of Union citizens, encouraged by Governor Grer's suggestion to establish an agricultural college, had a bill introduced in the legislature in February 1901 to establish an Oregon Industrial College in Union. The bill was opposed strongly by the Board of Regents of the State Agricultural College and was defeated. The discouraged Union delegation, while still in the Salem-Portland area, received the suggestion that they request an experiment station.[2] A proposal for the establishment of a branch experiment station was written immediately and presented to the legislature, where it was received favorably. The House suspended the rules, considered, and passed the proposal. The Senate passed the bill the following week.

The legislature realized that vast differences between eastern and western Oregon in climate and vegetation made establishing a branch experiment station a priority. State land, consisting of 620 acres located at the west edge of Union, was transferred to the State Agricultural College. The legislature appropriated a sum of $10,000 "for the purpose of erecting, construction, furnishing, and equipping the said buildings..."[3]

Professor A.B. Leckenby, appointed superintendent in March 1901, began active management within the constraints of existing leases of the property. A contract was let in July to build a two-story brick building to be used as offices and seed handling. The building was completed in October 1901 (Figure 1). Thus, the Eastern Oregon Branch Experiment Station, as it was named then, progressed in 1 year from a suggestion by the Governor through legislative action encouraged by a delegation of Union citizens to an experiment station with a superintendent and a brick building. The Union Station was the first branch experiment station established in Oregon and continues to be the only branch station owned by Oregon State University.

Objectives and Organization

Concisely stated, "the object of this Experiment Station is to carry on such lines of investigations as will be helpful to the agricultural interests of Eastern Oregon."[4] Underlying this objective was the goal to improve the efficiency of agriculture, rural life, and the rural home. The Experiment Station would investigate local agricultural problems that appeared to have immediate solutions. Results, along with information collected from other areas, were to be passed along to those who could use the information.

A superintendent under the direction of the Dean of the School of Agriculture was responsible for all activities. Much was expected: to conduct experiments and demonstrations with livestock and crops; provide breeding stock and seed; test varieties of many crops, vegetables,

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[1] The *Weekly Eastern Oregon Republican*, January 27, 1901, Union, Oregon.

[2] Letter by George F. Hall to Dick E. Richards, 1943, Appendix 1.

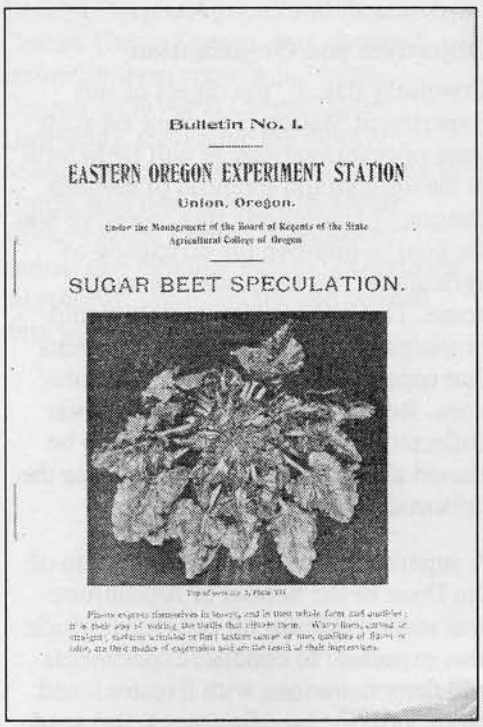
[3] The *Weekly Eastern Oregon Republican*, February 23, 1901, Union, Oregon.

[4] Withycombe, Robert. 1914. *Report of the Eastern Oregon Branch Experiment Station*, 1913-1914.

and fruit; improve and keep the physical features of the Station in a creditable condition; communicate results via telephone, newspaper, mail, annual meetings, and displays at fairs; and operate within the budget. Some of these expectations gradually were shifted to the Extension Service and to producers of breeding stock and seed.

Fortunately, the Station had sincere, dedicated superintendents who, often with the farm laborers, constituted the work force. Professional personnel assigned to the Station (see Appendix 2) were under the supervision of the superintendent. Professional personnel took the initiative to select and execute investigations and activities important to the local area and within the resources available. Gradually, the application of more sophisticated field and laboratory procedures helped to find underlying principles that explained cause and effect. In recent decades, results from many experiments have had regional and national application in addition to local importance.

Local suggestions, advisory committees, and advice from State and federal departments, services, and agencies aided the selection of research. Personnel at the School of Agriculture, Oregon State College, and Oregon State University, serving in an advisory capacity, were careful to preserve the individuality and inspiration of research leaders. Personnel in Corvallis became more active in the Station's planning and research as transportation and communications improved. This especially applied to research in range-forestry-game-fish-livestock-environment interactions and work by graduate students.


Bulletin No. 1.

EASTERN OREGON EXPERIMENT STATION

Union, Oregon.

Under the Management of the Board of Regents of the State Agricultural College of Oregon

SUGAR BEET SPECULATION.

Figure 2. Photo of the first publication produced by Eastern Oregon Branch Experiment Station, published early 1902.

Numerous kinds of publications have been used by the Center to inform the public (see Appendix 3). In earlier years, reports, such as the Superintendent's report, were printed in sufficient quantity for public distribution. For example, an inexpensive, unnumbered page or two related annual results of an investigation of feeding trials. Handouts like those usually were prepared for field days. Numbered station bulletins, circulars, and circulars of information summarized several years of results. In addition to annual bulletins, in the last several decades publishing in professional journals has become the standard method used by professional personnel. Information in academic papers is publicized less formally in radio, television, magazines, bulletins, circulars, and proceedings of conferences and meetings.

The Eastern Oregon Experiment Station was combined in 1974 with the Squaw Butte Experiment Station for administrative purposes. The combined locations were renamed the Eastern Oregon Agricultural Research Center. To this name was added the location name, Burns or Union. The superintendent has resided in Burns since 1976.

Land and Buildings

In 1901, the State of Oregon transferred ownership of 620 acres of land to the Oregon Agricultural College for the establishment of the Eastern Branch Experiment Station. The land had been purchased in 1894 for $25,000 as a site for an asylum, which was never built. This block of land has remained intact, except for a few acres along the south edge, which were sold to the Union Pacific Railroad. The land, although located on the fertile, rather smooth outwash plain of Catherine Creek, required improvements for research purposes.

In the early years, portions of the Station were leased to local farmers while land was improved and gradually added to the Experiment Station. Removing excess water, especially in late winter and early spring, was an immediate challenge. Sloughs used as irrigation ditches and a small, shallow reservoir adjoining the Station on the east contributed to the drainage problem. Ditches dug in 1903 started to improve the excess water problem. Installation of tile drains by hand in 1909 greatly improved a block of land for cultivation. Periodic maintenance was required; two main lines were replaced in 1959. The system continues to function satisfactorily after 90 years.

Established water rights for most of the acreage was a major asset. Land leveling to improve gravity flow irrigation and suitability for research plots was done intermittently with horses and later with tractors. Sprinkler irrigating was started in the 1960s. Approximately 30 acres in the west part of the Station were sub-soiled in the 1960s to break hardpan.

Before 1901, the land had been used for grazing and hay production. Fences, corrals, and buildings needed to be repaired, remodeled, or constructed. The original "Warren house" served as the residence for the superintendent until 1922, when the current residence was built. A brick building was built in 1901 for offices and seed handling. Within a few years, the upper floor was finished as a meeting room and for exhibiting grains, grasses, and forage plants. Modernizing in the 1950s included the installation of restrooms and a central heating system. The building continues to be used for offices and is currently undergoing extensive renovation, including the addition of more office space and a conference room.

Major improvements in buildings and feed yards were started in 1911. A 40' x 90' barn with haymow was completed in 1912 for work and breeding horses (Figure 3). The ground floor was remodeled in the late 1950s by replacing horse stalls and feed bins with a machine and repair shop that had doors of sufficient size to accommodate trucks. A machinery storage building was erected near the horse barn in 1911–12. This building is now used for storage. Pigpens with sheds located to the west of the machinery building were improved to accommodate 12 sows. Another small building near the barn contained a shop and two rooms for farm helpers. This building and the piggery were torn down in the late 1950s. A shed for tractors, trucks, and machinery was built in this area in the 1960s.

Construction of a large livestock barn, the south barn (Figure 4), followed the construction of the horse barn. The south barn was constructed sturdily to withstand the winds, which blow down Pyle's canyon. The walls of the first floor were made of rock. The haymow had sufficient size to store large quantities of feed. Pipe was laid in 1921 to connect the south barn to the Union water system. Upright wood silos were added to the northwest and northeast corners by 1920; they were removed in the 1950s after a trench silo had been dug. Over the years, the south barn has been used for many purposes—feed storage, shelter for calves and lambs, milking parlor for the dairy, seed cleaning, and individual feeding of beef animals, which continues to be the primary purpose today.

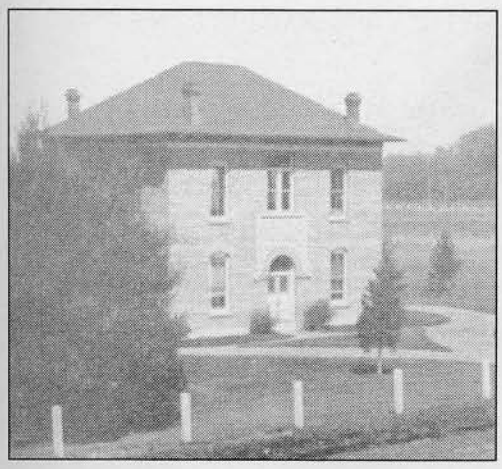
A sheep shed for lambing and shearing was constructed to the east of the south barn soon after the sheep flock was expanded in 1932–33. This shed was used continuously into the 1970s for sheep, and now serves as a calving barn. A chicken house of sufficient size to accommodate up to 400 hens was constructed to the east of the horse barn about 1927. This building was removed soon after the poultry project was ended in the early 1930s.

A block of 2,000 acres of foothill meadow and forestland was purchased January 1, 1941 from the Hall family. The Hall name was retained for the ranch. The purchase price was $12,000. The ranch had been leased by the Station for grazing sheep and cattle for several years prior to purchase. A dense stand of Douglas hawthorn, *Crataegus douglasii*, occupying much of the meadowland adjacent to Catherine Creek, was removed in the late 1950s. Removal of some regrowth of hawthorn was done in the 1970s. These meadows were seeded to introduced grasses and legumes.

Considerable fencing and cross fencing was done to accommodate cattle grazing and range and forestry studies. Stock ponds were constructed. Corrals built in the 1960s were moved to a more convenient location in 1978. Stands of marketable timber provided research opportunities to evaluate the effect of logging on plant succession, animal usage, and erosion. A few uncontrolled fires occurred; fortunately, the fires were soon controlled. The Hall Ranch was and continues to be a valuable research location.

Construction of a one-story, concrete block building for offices, a drying oven, and laboratory space was completed in 1959. The last building, built between 1966–68, and located south of the south livestock barn, was designed especially for individual feeding of beef animals, mainly bull calves. Today, it provides additional feed and equipment storage. This "Bull barn" also has been used on field days for research presentations.

Major changes occurred to the Station's physical condition, activities, inputs, and research between 1955 and 1960. The office building, barns, and sheds were remodeled. Old machinery, sheds, and fences that were not needed were salvaged. The tile drain was repaired. Modern technology was injected into research and publishing of results. Definite forest and range investigations for the Hall Ranch were outlined and started. Within two decades, the Hall Ranch research was expanded to include big game, fish, and water. Computers and the Internet have added their changes in the last two decades.



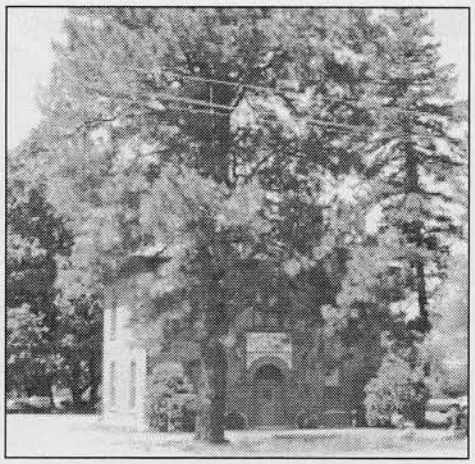


Figure 3a.
Black-and-white photo of office building, about 1909.

Figure 3b.
The office building today.

Figure 3c.
An architect's drawing of the new addition.

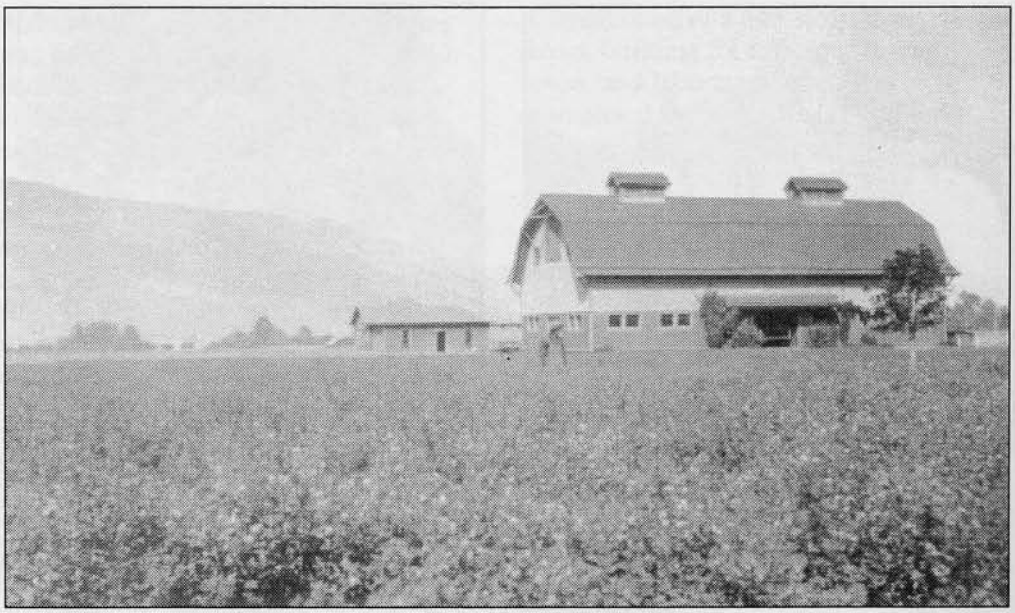


Figure 4a,
One of the earliest photos of the horse barn.

Figure 4b.
A recent picture of the horse barn, which is now used as a maintenance shop.

Figure 5a.
In 1949, the south barn was used for feed storage and individual feeding trials.

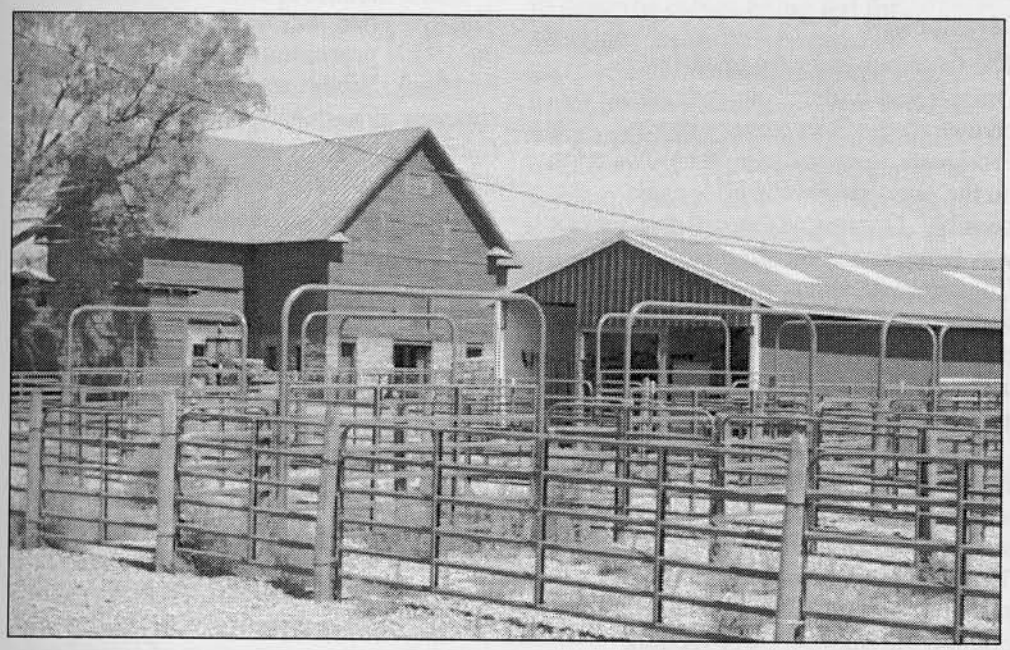


Figure 5b.
South barn today. In the foreground new handling facilities and corrals allow for efficient working and sorting of livestock.

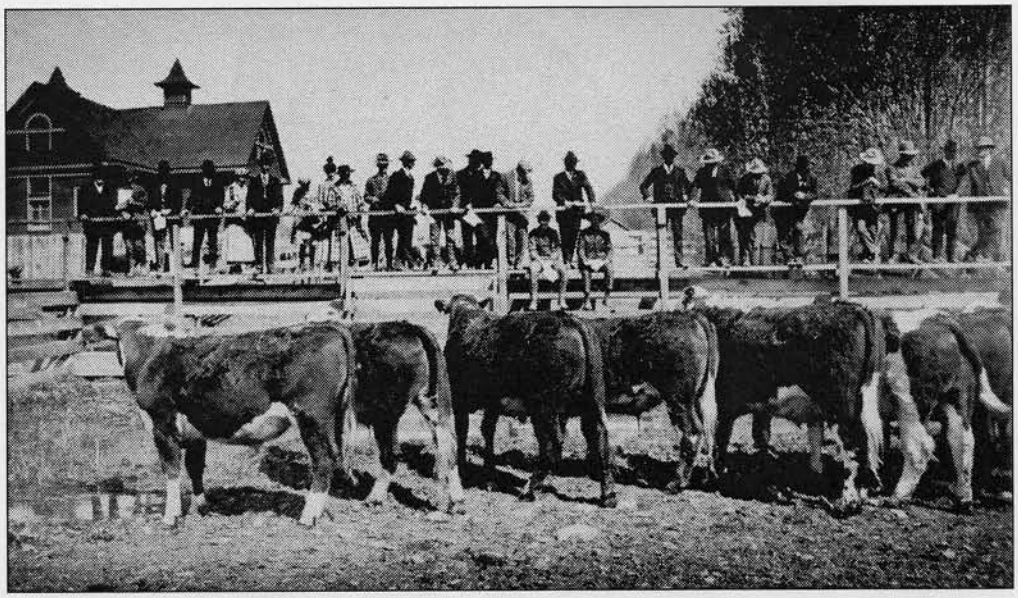


Figure 6. Looking over feedlot steers during the alfalfa hay and silage field day. Photo from *The 1917–18 Biennial Report.*

Livestock

The livestock industry in eastern Oregon was undergoing considerable change as the 20th century began. Producers were realizing that expansion on the open range was no longer possible. Grazing in the national forests was being based on allotments. Consumer demands were changing as well. People wanted better quality meat than that from 3- and 4-year old steers and thin lambs. Improved breeding stock was also in demand.

Beef: Expectations for four purebred shorthorn heifers purchased in 1904 to start a breeding herd were short lived. These animals were sold in 1905 in response to a shortage of funds to operate the Station. Steer feeding started in 1904 also ended in 1905. Selling price of these steers was $44.40 per hundredweight in Portland.

Beef operations were resumed 1908–1909 with the finishing of range steers for slaughter. Carload lots were fed various grain-alfalfa rations. Sources of roughage such as alfalfa, alfalfa-grass, grass, straw, silage, and pasture were compared. Less bloat occurred when alfalfa was not the sole source of roughage. First cutting alfalfa, which was stemmier and coarser than later cuttings, caused less bloat.

The low price and surplus of wheat in the 1930s prompted feeding wheat to livestock. Wheat was equal to or superior to barley. Rye, when fed as one-fourth the grain ration, was equal to wheat or barley. Different rations fed to steers from 1943 through 1946 had less than a cent difference in cost per pound of gain. During the 20th century, daily rate of gain gradually increased from 0.8 to 1.2 pounds per day for 2-year-old and older steers, to present gains of 3 pounds or more for large calves.

The comfort of animals in the feedlot was of concern. Shelter from sheds was compared to shelter from windbreaks. Water warmed to 43°F was compared to water in an open ditch in the winter. Neither sheds nor warm water improved gains; however, protection of some kind from winds was helpful to wintering animals and increased feedlot gains.

Shrinkage of livestock while being shipped was of concern. Data was collected in 1915, and for many years thereafter, on the Station's beef, sheep, and swine shipped to market by railroad. The kind of feed consumed before being shipped did not influence shrinkage.

Cattle were grazed annually on a forest allotment on Upper Catherine Creek starting in the 1920s and continuing into

the 1950s. Usually, 75 to 85 cows and their calves were put on the allotment. No research was done with this grazing. Fall grazing was secured by renting nearby pasturage in the Grande Ronde Valley. This required considerable expense to find sufficient forage and to move cattle.

A 6-year study, started in 1924 with 100 heifers, compared breeding heifers to calve as 2-year-olds to those bred to calve as 3-year-olds. Over winter, rations were part of this work. Heifers fed over winter on limited alfalfa or alfalfa and straw had as good a conception rate and calf crop as those fed more alfalfa or with grain as part of their ration. In general, heifers calved as 2-year-olds were more profitable than those having their first calf when 3 years of age. Later results indicated replacement heifer calves should have an overwinter ration sufficient to provide a daily gain of approximately 1 pound, be grazed during the summer, and fed alfalfa-grass hay the second winter.

In response to ranchers' interest in inexpensively winter-growing animals that were to be grazed the following summer, over 50 years of investigations were conducted at the Station. Briefly summarized, winter gains were proportional to the amount of feed in addition to that required to maintain the animal's weight. Four or 5 pounds of alfalfa hay having more than 10 percent protein provided sufficient protein when fed with forages of low protein such as grass hay, straw, or silage. One pound of a protein supplement provided enough protein to supplement low protein forages. Later, protein blocks proved to be a convenient method of supplying protein.

Stock steers and heifers making large winter gains made less gain during summer grazing than those making less winter gain. Thinner cattle made more gain during summer grazing than cattle carrying considerable flesh. The conclusion from research and observations was that steers and heifers gaining 1 pound daily over winter made optimum use of summer grazing.

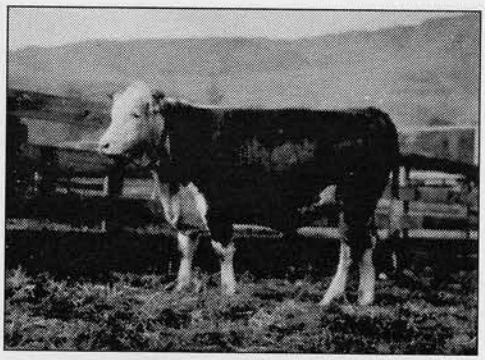


Figure 7. Best gaining steer in baby beef study: fed 139 days with daily gain of 2.91 lb, starting weight 355 lb, ending weight 706 lb, May 5, 1934.

Knowledge was gradually accumulated that the cost of gain was much less with younger steers than with older steers. The term "baby beef" was used in 1922 to describe calves being fed for slaughter. Large calves fattened satisfactorily; small calves did not. Later results indicated calves should weigh at least 500 pounds, preferably over 600 pounds, when going into the feedlot. Packers and some consumers did not readily accept the quality of meat from baby beef.

Superintendent Richards, in summarizing numerous experiments, concluded that feed efficiency decreased as the age of the animal increased. Calves produced 2.6 pounds of gain compared to 1 pound of gain by 2-year-old steers on the same quantity of a grain-alfalfa ration.

Straw as part of the ration for wintering mature beef cows reduced cost without adverse effects on calf birth weight, calf weaning weight, and the ability of the cow to conceive. The quantity of protein in the total ration determined the need for protein supplement.

Time of castration and management of bull calves to be slaughtered as long yearlings received attention. Bulls had higher daily gains and carcass yield than steers. Taste tests rated bull meat less desirable than steer meat. Diethylstilbestrol implants increased gain in steers more than in bulls. There was an advantage to starting implants early.

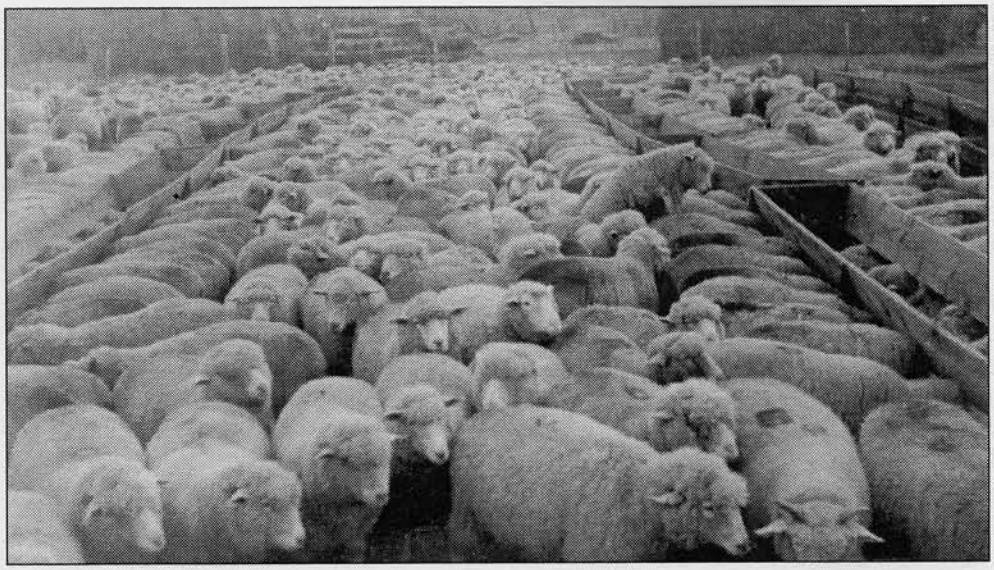


Figure 8. Eastern Oregon Experiment Station sheep band at feeding time, January 1951.

Realization of the genetic potential from increasing growth rate started the Station evaluating four lines of breeding stock in 1946. Percent calf crop, growth rate of suckling calves and in the feedlot, carcass grade, and dressing percent were some of the measurements used to evaluate the lines. Selected bull calves were fed individually after being weaned for rate of gain and feed efficiency. A few of the bulls were sold for breeding purposes. The cause and reduction of calving difficulties were part of these studies. Line breeding ended in the early 1970s, when the value of cross-breeding (heterosis) became apparent. Crossbred calves compared to straight-bred calves were 10 percent heavier at weaning, gained 10 percent more in the feedlot, were slightly more feed efficient, and had higher carcass scores.

The most extensive disease problems experienced by the beef herd were contagious abortion in the late 1920s, red water starting in the late 1950s, and scours in newborn calves. In 1959, 10 percent of the cowherd was lost to red water. Nutrition levels of beef cows before calving, the injection of cows with vitamin A or with *Eacherickia coli* bacteria, and the injection of calves with vitamin A did not reduce the incidence of scours.

Sheep: For numerous years, 1914 to 1930, black-faced crossbred lambs were purchased for feeding trials in response to questions about what to feed lambs not having sufficient size or flesh for slaughter. Local forages and grains were compared in various combinations. Grain was needed with alfalfa to fatten lambs. Third cutting alfalfa, which usually was more palatable and had higher protein content, was superior to first and second cuttings. Grain hay and wheat chaff were unsatisfactory as roughages. Chopping hay was of no economical advantage. Barley and wheat were good grains for fattening lambs. There was no value in rolling or grinding grain for lambs. Roughly 200 pounds of good alfalfa and 100 pounds of grain made a feeder lamb into a lamb ready for slaughter.

Later, lamb feeding provided additional conclusions. Fattening lambs only on pasture was not satisfactory; however, lambs fed grain on pasture made rapid gains and were of good quality for slaughter. Sheds for lambs on feed were not needed; wind protection was helpful. Single suckling lambs had higher rates of gain than multiple birth lambs. Creep feeding increased daily gains of multiple birth lambs more than single lambs.

Gains of feeder lambs fed a pelleted ration were not affected by the size of pellet, percent alfalfa roughage in the pellet, or fineness of grind of the roughage. Lamb gains were larger and cheaper when the pellets contained 14 percent protein compared to 10 percent protein. The cost of pelleting offset the economy of feeding pellets.

Diethylstilbestrol injection increased the rate of gain by 10 percent of lightweight and early-weaned lambs in the feedlot. Induced pseudo-crytorchidism of male lambs produced increased rate of growth but inferior carcass compared to wether lambs. No significant differences in cooking and meat quality were observed.

A farm flock was established in 1917 when 230 grade Hampshire ewes were purchased. Pea and bald barley, corn, and sunflower silages were compared with alfalfa hay as a winter ration. One pound of silage daily was the most efficient rate of feeding silage with alfalfa hay. An alfalfa-silage ration was no better than alfalfa alone. Complete income and expense records helped in promoting practices contributing to the success of a farm flock. Percent lamb crop was the dominant factor contributing to financial success.

A range band of ewes having mostly Rambouillet breeding was purchased in late 1932 in response to the Station's assignment to solve problems of the owners of range bands. The band was maintained at 700 or more head until it was sold in 1955. Comparing different rations for wintering range ewes was started immediately. Alfalfa hay proved to be a satisfactory ration. Rations low in protein, such as below 14 percent, needed a protein supplement. Substituting silage for part of the ration did not reduce cost or improve lamb production. Rations of low energy were a primary cause of pregnancy disease.

The band was grazed in the summer on the national forest southwest of Anthony Lake on the Crawfish allotment. Many of the Hampshire ewes of the farm flock went with the band. Weight gains or losses of the Hampshire and some white-faced ewes and their lambs were obtained while grazing in the forest. The Forest Service requested such data to aid in estimating the value of grazing in the forest. After the Crawfish allotment was terminated in 1941, ewes were summer grazed on leased private land near Wallowa and the Hall Ranch. Fall grazing was secured on private land in the Grande Ronde Valley.

Columbia rams were purchased from the U.S. Sheep Experiment Station, Dubosis, Idaho in 1945; later, Columbia and Targhee rams were purchased. One hundred yearling ewes were purchased from Cunningham Sheep Company in 1946. For many years, rams and ewes were sold locally for breeding stock, which fulfilled one of the reasons for establishing the Station. Rams also were sold in ram sales. Fleeces were exhibited at such fairs as the Pacific International in Portland.

A breeding flock of 200 or more ewes was maintained from 1955 until sheep work on the Station was discontinued in 1979. The flock consisted of Columbia, Targhee, Hampshire, and crossbred ewes. Individual feeding of ram lambs was started in 1955 and continued for many years. Differences between rams were measured in important traits such as rate of gain and feed efficiency. A very definite inverse relationship existed between rate of gain and pounds of feed per pound of gain; higher daily gains were associated with lower pounds of feed required per pound of gain. Progeny testing showed these traits were inherited, which supported the potential for flock improvement through sire selection.

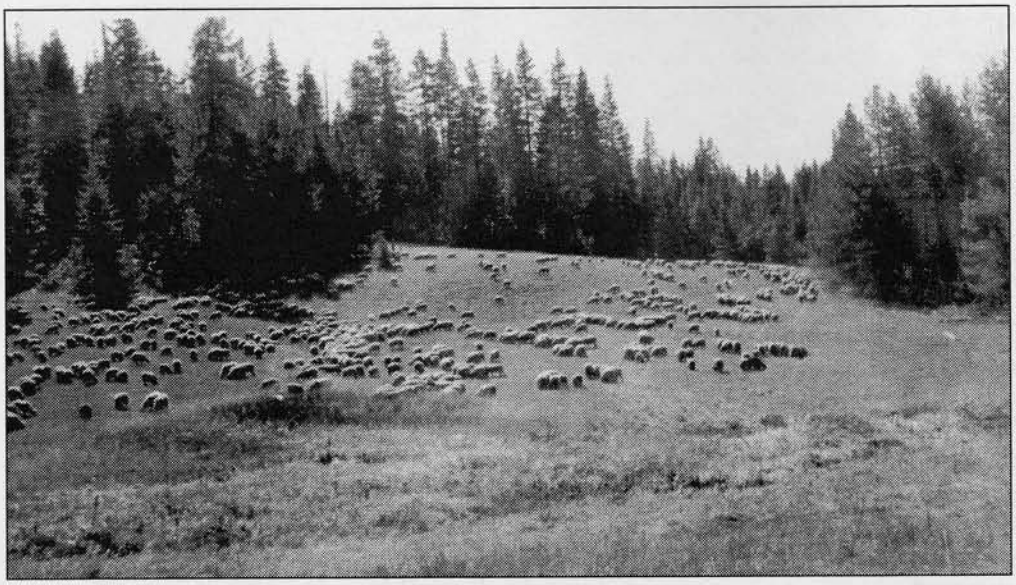


Figure 9. Eastern Oregon ewe band on summer range in the Wallowa Mountains, August 1950.

Two distinct management practices, breeding ewe lambs and using hormones to induce five lamb crops in 4 years, were investigated in the 1960s. Breeding well-grown ewe lambs increased cumulative production through 6.5 years compared to breeding ewes as yearlings. Ninety-four percent of crossbred ewe lambs exposed to rams lambed; only 44 percent of Columbia and Targhee ewe lambs lambed. The crossbreds had a much higher percent of multiple births. Columbia and Targhee ewes, which lambed as yearlings, were more productive in their second through fourth year than ewes, which did not lamb until 2 years old. Numerous complications, such as low conception rates and the necessity to wean lambs when small, made hormonal injection not a viable option for increasing lamb production.

The Board of Regents' report of 1924–26 contained the following: "Eastern Oregon sheep owners are suffering considerable losses from a peculiar stiffness of lambs." Stiffness and losses also were occurring in newborn calves. Later, this disease received the name "white muscle." Observations indicated an association between white muscle and better quality hay fed to ewes before lambing. In the winter of 1943–44, alfalfa hay grown in an area plagued with white muscle was shipped from Redmond to Union. Results were frustrating, since no white muscle occurred in lambs whose mothers were fed alfalfa from Redmond or from Union. In the 1960s, non-Station research proved white muscle resulted from a selenium deficiency. Alfalfa produced in many eastern Oregon areas did not supply sufficient selenium to meet the requirements of pregnant ewes and cows.

Swine: Swine was an important class of livestock to the producers of grain, and especially to those not having ready access to railroads. For instance, at the start of the century, hog buyers trailed herds of hogs, sometimes numbering hundreds of head in size, from Wallowa County over Tollgate to the Walla Walla area for shipment. The importance of swine was the main reason the Station engaged in swine investigations starting in 1909.

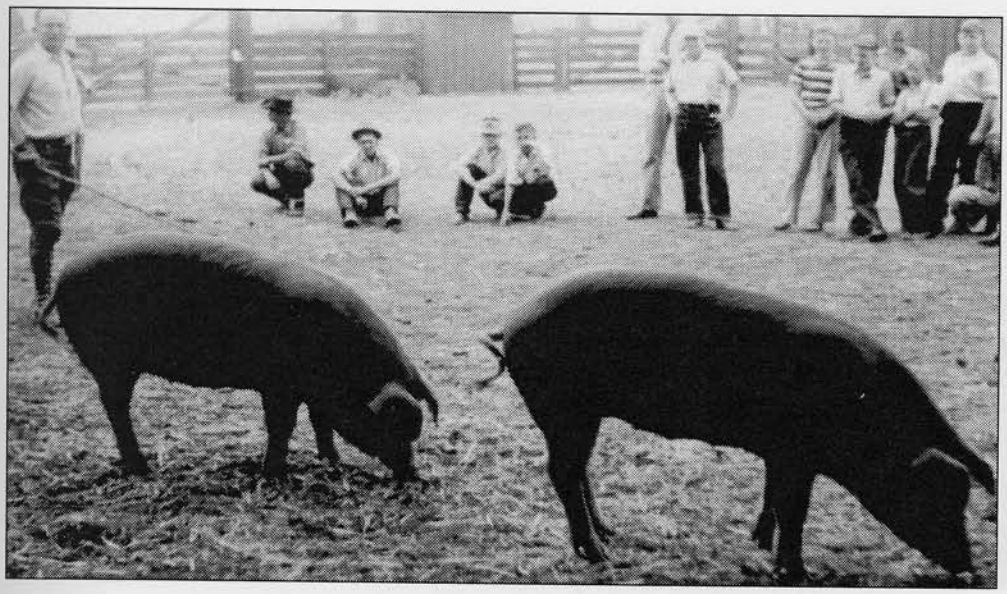


Figure 10.
4-H kids practice judging swine during a tour, July 16, 1940.

"There is probably no animal upon the American farm the profits from which paid off more mortgages, built more houses, fed, clothed, and schooled more children than the hog."[5]

Various management practices for growing gilts and feeding sows with litters were used while comparing Yorkshire, Berkshire, and Poland China breeds. General care and avoidance of diseases were important. Thriving thin sows had larger litters than sows carrying excessive flesh. Sows getting plenty of exercise had stronger litters than sows confined to small pens.

At times, up to 200 head of feeder pigs were being fattened. Self-feeding was compared to hand feeding. Grain supplemented with kale, root crops, alfalfa hay, clover hay, and peas were tried. The need for and value of protein supplement for the feeder pig and the breeding herd was demonstrated. Alfalfa and peas were the only locally grown protein feed available in quantity. Each, whether utilized in "hogging off" during the summer or fed at other times as hay or dry peas, was a profitable supplement to an all grain ration. Pasturing crops other than alfalfa and peas while feeding grain was not as profitable as grain-tank age ration.

Only three sows were on the 1932 inventory; however, swine numbers increased when the feeding of low priced surplus wheat was started before World War II. Feed trials reaffirmed that wheat plus a protein supplement was a good feed for hogs when mixed with other grains, or fed while hogs were on pasture. Tarweed seed, as a contaminate in wheat, was poisonous; tarweed was a difficult weed to control in grain crops before 2,4-D and similar herbicides.

Boars were sold and boar service was provided.

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[5] Withycombe, James. 1910. Circular bulletin No. 9. Oregon Agricultural College and Experiment Station. For distribution on the Farming Demonstration Train of the Oregon Railroad and Navigation Company. (*This publication did not have a title.* FVP.)

Figure 11a. Harvesting hybrid corn, 1940.

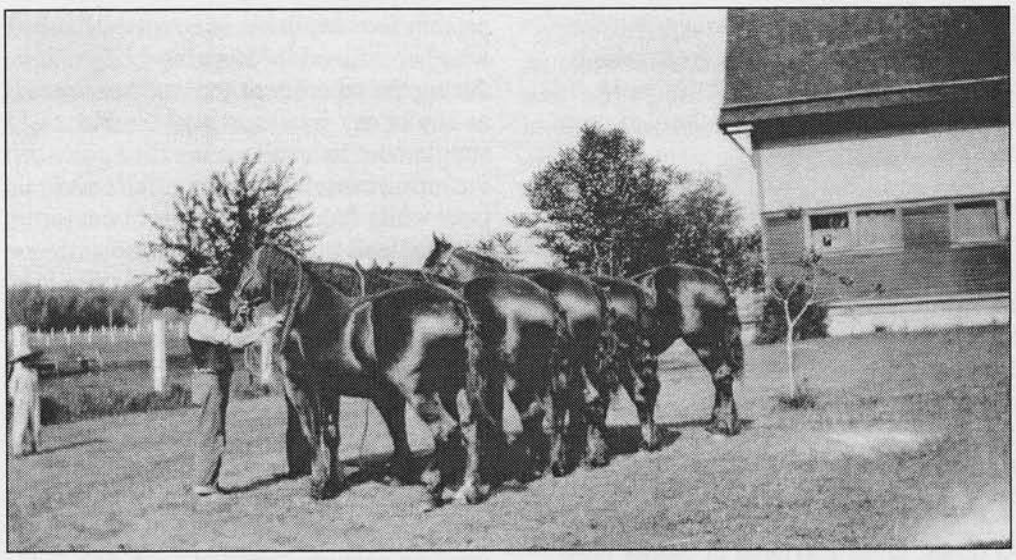

Figure 11b. Floyd Edwards shows off Station horses, 1934.

Horses: The purchase of two young Percheron mares in 1911–12 started the raising of work horses. At times there were as many as 10 mares, which were used for fieldwork. Stallions, stud colts, and mares were sold. A limited amount of stud service was provided. In 1940, the breed of horses was changed to Belgians.

Horse breeding ended in 1946. A team of work horses was used for winter-feeding of cattle and sheep as late as 1959. One or more saddle horses always have been part of the station and continue to be kept. There was no breeding of riding or driving horses.

Dairy: The purpose of the dairy was to demonstrate management practices that would improve production. Little research was done. Complete records were kept of feed consumption, pasture, milk production, and butterfat content; labor, cost of production, and sales of butterfat and animals. Comparing feed consumption and milk production of individual cows provided very firm information to dairymen about the importance of eliminating "boarders" (low-producing cows). The dairy which was maintained at a size of 15 to 20 milking cows, was compatible with a one-man dairy with a milking machine. The usefulness, maintenance, and sanitation of the milking machine, which was in its infancy, received much attention by dairymen.

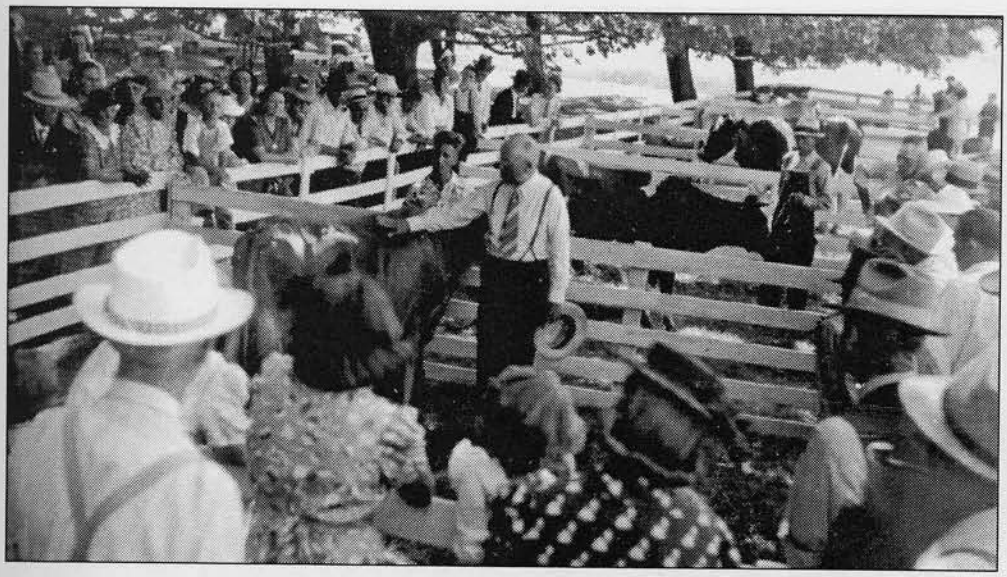

Figure 12. Professor P.M. Brandt discusses breeds of dairy cattle at the Union County Cooperative Creamery field tour and picnic at the Experiment Station, 1939.

Figure 13. E.O.E.S. chicken house between 1926–1930.

Fortunately, an outstanding sire was selected; the greater productivity of his offspring was evidence of the potential for improving butterfat and conformation when a superior sire was used. At one time, the Station had five purebred bulls on loan to local dairymen in a "proven sire" program. Breeding stock was sold. The dairy herd was assembled by 1924 and was dispersed by 1934. The success of the dairy contributed to the establishment of dairy cooperatives and creameries in many communities in eastern Oregon.

Poultry: Motivation for poultry work came from Oregon State College's success with perfecting trap nesting of laying hens; hens could be identified which had superior egg laying ability. A shipment of 500 Barred Rock chicks to the Station in 1927 started the poultry project. A similar number was received in 1928. The purpose was to demonstrate methods and equipment helpful to increasing egg production. The brooder house, laying house, feed storage, feeding, and care of eggs received attention. Records were kept on all costs; returns, building, and equipment provided an estimate of the profitability of egg and poultry production. Some roosters and eggs for hatching were sold. Poultry work ended in 1932.

Figure 14. Stock beets and carrots in middle foreground of Experiment Station booth at the LaGrande Grange Fair September 28–29, 1933.

Crops

Forages: At the start of the 20th century, a major concern of ranchers was having sufficient, low cost forage for wintering animals, which were grazed from spring into fall on open range and forested land. Possible winter forages were grass hay, cereal hay, straw, silage, and root crops. Grass hay and cereal straw were available in quantity. Oats and rye were grown for cereal hay in the drier regions.

Despite the loss of most of the station's appropriated funds in 1905, J.K. Weatherford, President of the Board of Regents, stated to Governor Chamberlain, "the board, however, are much elated over the progress that has been made under the adverse circumstances".[6]

Just about every forage plant that might be adapted was grown on the Station sometime during the early years of its existence. Small plots in nurseries were the standard method used to determine adaptation and productivity. The more promising forages were grown for many years and usually in larger plots. At one time, similar plantings of many types of forage were made near North Powder, on the Station, and near Cabin Creek in north Union County to provide a range of environmental conditions, primarily annual rainfall.

Alfalfa was in its infancy in 1901. The Station directed much attention to alfalfa after realizing that alfalfa was adapted to irrigated and dryland production, yielded a sufficient quantity of quality forage to support a large livestock industry, and was inexpensive compared to some winter feeds. By 1910, the station was still confined to only 160 acres, with the remaining 460 leased from year to year to the highest bidder. The circumstances did not deter scientists, and testing established the Turkestan variety from China as having sufficient hardiness for dependable winter survival.

Succession of widely grown public varieties was to Grimm. By 1925, Grimm was in use on approximately 60,000 acres in eastern and western Oregon. This resulted in an increase of at least 30,000 tons of hay with a net worth of $240,000.[7] During the winter of 1924–25, when common alfalfa froze or thinned out, Grimm alfalfa survived the bitter cold. According to an article in

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[6] *Annual Report of the President of the Oregon Agricultural College Experiment Station*, 1906.

[7] *Director's Biennial Report—1924–1926*, October 1926. Agricultural Experiment Station Oregon State Agricultural College, Corvallis.

The Oregon Farmer, July 21, 1932, the Union Station had "Oldest Alfalfa in State" planted 25 years earlier by Superintendent Robert Withycombe. Following Grimm, subsequent varieties included Ladak, valuable on dryland for one cutting; Ranger, which made more than one cutting possible; then Vernal. After Vernal, private varieties became popular.

Alfalfa-grass hay was demonstrated to have less bloat hazard than straight alfalfa hay. Alfalfa-grass yielded approximately the same as only alfalfa and was more resistant to the invasion of downy bromegrass (cheatgrass).[8] Late maturing orchardgrass, such as Latar, was a compatible companion with alfalfa.

Tripping the alfalfa flower to induce seed production received attention soon after the Station was established and again in 1939 in cooperation with the USDA. Another cooperative project with the USDA collected data from 1919 through 1931 on the relationship of measurements and weight of haystacks.

Alfalfa yield responses to sulfur were observed in northeast Oregon before 1920. On the Station, an average yield increase in alfalfa over a 22-year period (1920–1942) was one-third ton per acre from fertilizing annually with gypsum or manure. Off-Station experiments in northeast Oregon in the 1960s pinpointed areas deficient in sulfur and phosphorus for optimum legume production. Sulfur concentration in alfalfa herbage declined as the plant grew to hay stage. This emphasized the need to relate percent sulfur and growth stage when using percent sulfur as a diagnostic tool. A malady of alfalfa found in a few fields was attributed to the lack of sufficient symbiotic nitrogen fixation.

Many forage legumes were grown: none produced sufficient forage to be competitive with alfalfa as a source of hay.

White clover was consistently valuable for its forage quantity, quality, and palatability when grazed. Companion cropping of peas with a cereal was recommended for hay or silage. Eventually, pea-cereal forage production was replaced by alfalfa; alfalfa yielded more forage of higher nutritional value and cost less per ton to produce.

A small acreage of field corn had been grown in the Grand Ronde Valley before 1901. This helps explain why the Station grew "some 20 varieties of field corn" in 1906 and included corn harvested as silage in rotation work. Midwest, early maturing hybrid varieties developed by 1940 increased productivity, but they did not overcome the serious adversity of a short growing season having minimal heat units needed by corn. Pea silage was evaluated when this feed became available in quantity before World War II. A minor part of this work provided knowledge of the poisonous characteristic of black nightshade, *Solanium nigrum,* which was a contaminate of the pea silage.

The Station started raising stock beets and carrots immediately and continued as late as 1938. Yields of 30 and 40 tons per acre were produced; their feed qualities were acceptable when they composed part of the winter ration. Some of the disadvantages were the expense of production, the need for frost-free storage, and inconvenience of feeding in large quantities.

Because of Union's success with growing and evaluating grasses, it was chosen by the USDA to be one of the locations for the initial growing of crested wheatgrass. Local results agreed with those from other areas, that crested wheatgrass could be established and was productive in low rainfall areas. In contrast, crested wheatgrass was not adapted to higher moisture areas, such as the foothills or when irrigated. Seed production received attention. On dryland, rows 3 feet apart produced 260 pounds of seed per acre: solid plantings produced very little seed after the first year.

[8] D.E. Richards. 1942. Unpublished summary of crop production in the 1920s and 1930s on file at the Eastern Oregon Agricultural Research Center, Union.

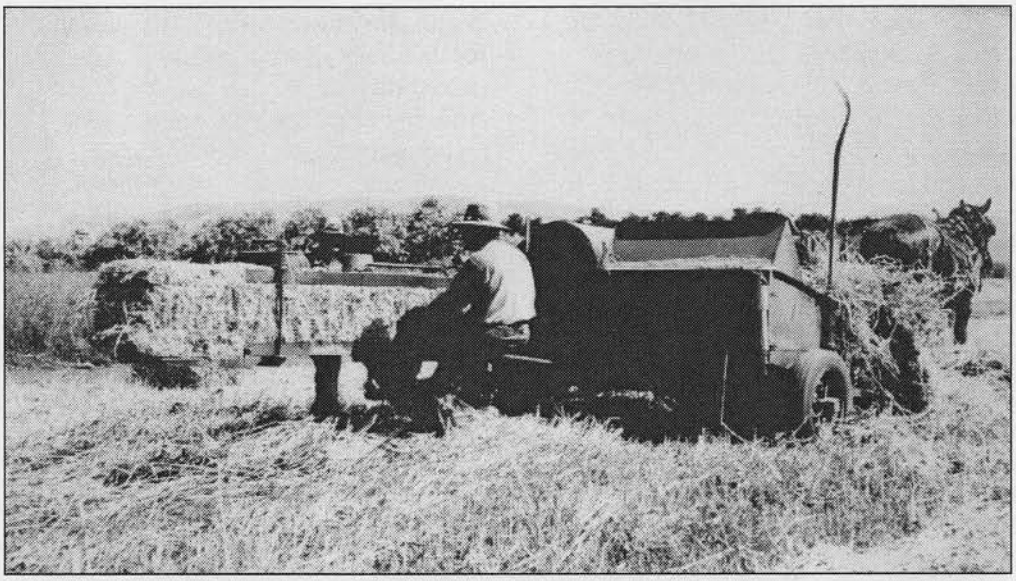

Figure 15a. Horse-drawn hay baler. During WWII, automated equipment, such as balers and elevators for stacking hay, reduced labor costs.

Figure 15b. Three-ton load of hay.

Work in 1960 suggested practices for improving seed production, mainly timely application of nitrogen fertilizer.

The Station was a major cooperator from 1930 to after World War II in the Soil Conservation Service regional project of growing many species and varieties of range plants. Adaptation, forage, and seed production information was supplemented with root growth and palatability when grazed or fed as hay. These investigations of root growth and forage palatability were some of the first done in the Pacific Northwest.

Cereals: Improvement of cereals was given immediate attention via variety testing. Breeding and selection soon became part of the program. Results within a few years indicated that winter planted cereals were more productive if they survived the winter than spring planted cereals. Black barley and black oats gradually were replaced by varieties with lighter grain color and stiffer straw. The variety Union beardless barley, which is still grown for cereal hay, resulted from this work. Input into breeding and selection declined as cereal work at the Moro and Pendleton Stations increased. Cereal breeding and testing responsibilities in northeast Oregon were transferred in the 1950s to

Figure 16a. Grass seed plots, *1942–44 Biennial Report.*

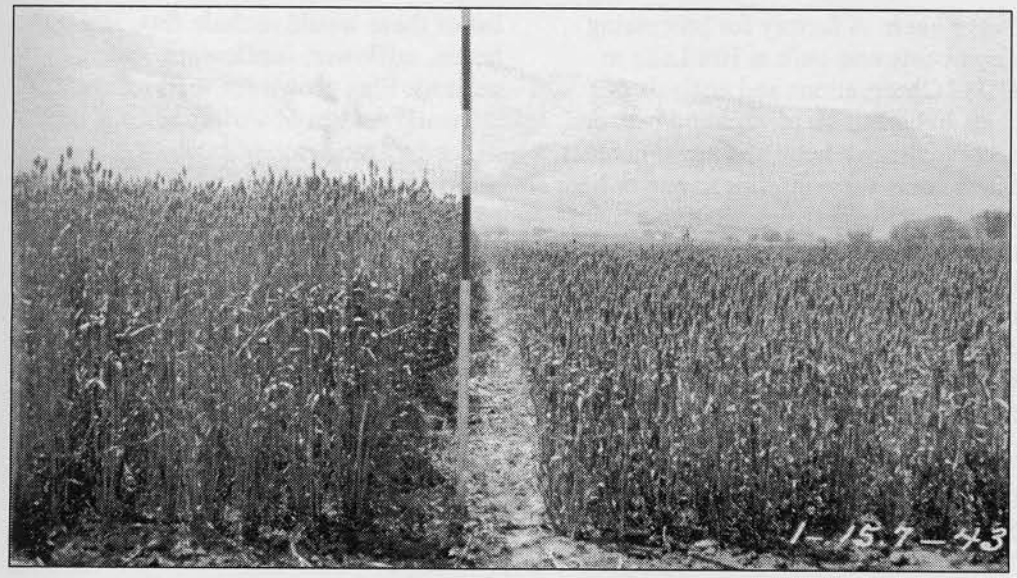

Figure 16b. Hybrid 128 wheat (left) is tall and lodges readily. In contrast, Elgin wheat (right) is short strawed, high yielding, and does not lodge, *1942–44 Biennial Report.*

the Pendleton Experiment Station (now named the Columbia Basin Agricultural Research Center).

An important contribution of early cereal work was supplying seed to growers. On request, seed was supplied in small lots for testing and increasing. This approach satisfied a desire by cooperators for information, adaptation, and productivity on their farms and, also, supported or denied Station results. Seed supplying was done for 50 years.

Research was concentrated on fertilizing cereals when commercial fertilizer usage increased after World War II. Off-Station results pointed out that nitrogen application was needed in most wheat fields for optimum yield. Sulfur application was needed in most fields fertilized with nitrogen. Quantity and timelines of moisture available were very influential to plant responses to fertilizers.

Livestock growers interested in grazing winter wheat prompted research. Wheat yield was reduced approximately 1 bushel for each 100 pounds of dry matter removed by grazing in early spring. This ratio of 90 to 100 pounds of dry matter to produce 1 bushel of wheat agreed with other results within the limitation that growth was not restricted by drought, heat during grain filling, or disease.

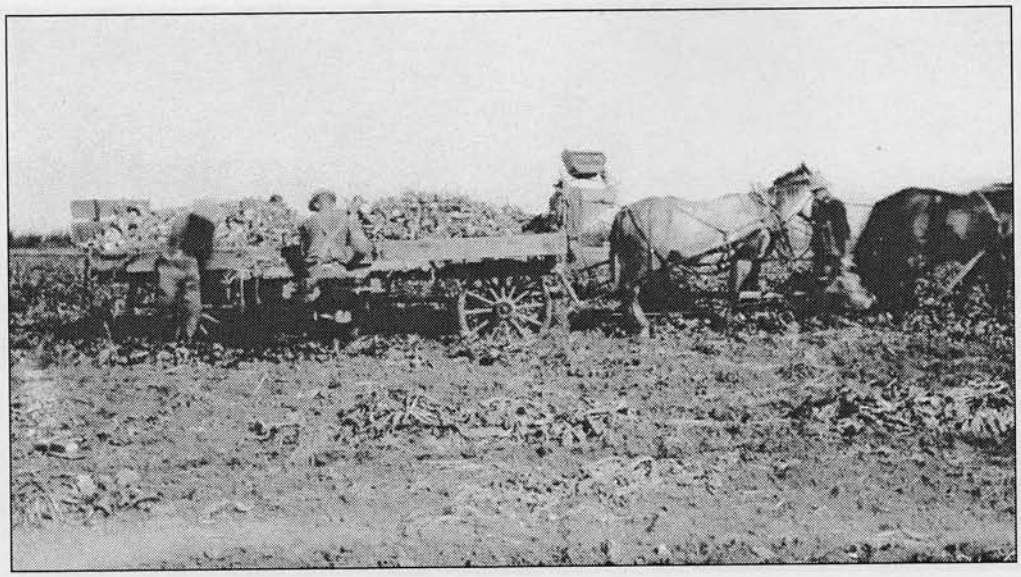

Figure 17. Harvesting sugar beets at Experiment Station, about 1902.

Sugar beets: A factory for processing sugar beets was built at Hot Lake in 1898.[9] Observations and analysis of beets indicated great variation between beets in growth habit and sugar content. Many beets were inferior in one or both of these characteristics. Station personnel immediately started selecting beets with superior physical features and improving seed production methods. These investigations were compatible with the limited personnel, machinery, and money available.

The Station's first publication, published in 1902, was titled *Sugar Beet Speculation*. Conclusions were critical "of boring a slanting hole about 1 inch in diameter through the center of the mother beet for the purpose of finding the sugar content by analyzing the core taken out. This method we claim is unwise, unnecessary, and injurious of the progeny." Part of the Station was leased for sugar beet production. A disease, curly top, became so severe within a few years that sugar beet production was not profitable; the factory was closed.

Miscellaneous crops: Most crops that might provide a protein supplement for livestock, have been grown at Union. A list of these would include flax, soybeans, safflower, sunflowers, and peanuts. Flax grown for seed received the usual studies of variety testing, date of seeding, and rate of seeding. Financial returns were compared to those from spring wheat and barley. Safflower, although not an early maturing crop, was marginally successful over the range of rainfall in eastern Oregon except the most arid conditions. Safflower production was not profitable. Producing sunflower seed was not reliable because some years freezing temperatures occurred before seed matured. Soybeans and peanuts required a longer, warmer growing season.

Some of the crops grown were rye, sorghum, tame mustard, artichokes, durum wheat, and many kinds of beans. A plant with the name Kok-saghyz was grown in 1942 in an attempt to find alternative sources of rubber. A good yield of roots having a high content of the material extracted for rubber was recorded.

The dominant restraints on plant growth, rainfall and temperature, gradually were realized. Winter annual crops were more productive than spring planted crops. Early maturing crops were more adapted than full season crops. Inadequate moisture during the summer was the limiting factor for full season crops not receiving supplemental moisture. The variability in the occurrence of the last

[9] Shaw, G.W. 1899. *Sugar beet experiments of 1898 and final conclusions*. Oregon Agric. Exp. Sta. Bull. No. 59.

Figure 18. Artichokes grown at Union Station, August 1, 1936.

Figure 19. Dick Richards examines smooth brome grass, which is high yielding and makes very palatable hay.

spring frost and the first frost in the fall were menaces to consistently growing crops not tolerant to frosts.

Seed: Producing at least some of the seed needed for experimental work was essential in the early years. The quantity and quality of seed produced plus the demand for seed of improved varieties encouraged seed growing as a specialized activity by some farmers. An intensive, progressive seed growing and processing industry was established.

Initially, seed was grown in rows 3 feet apart. Cultivation and hoeing were used for weed control. Off-Station experiments were conducted in turf seed producing fields in the 1960s. Large seed yield increases were obtained from timely nitrogen fertilizer application coupled with other improved management practices. Solid seeding became a standard practice.

Experiments established that residue removal in early fall was essential to obtaining high yields of quality seed. Sunlight on the crown of the plant aided the formation of cells, which later developed into seed heads. These cells were initiated between late fall and early spring in cool season grasses. Fall nitrogen fertilization stimulated seed head formation; spring nitrogen fertilization stimulated vegetative growth.

Figure 20. Harry McNeal checks corn in the 27-year fertilizer-rotation experiment, 1946.

Burning the residue extended the life of the planting.

Additional seed activities in the early years of the Station consisted of growing and selling seed of superior varieties. Some of the seed sold, such as sunflowers, field corn, and flax, would be unusual for today's agriculture. The Station cleaned seed for growers for a small fee.

Crop rotation: Rotating crops was considered an essential practice for successful, sustained agriculture in the early part of the 20th century. To contribute local information to this pool of knowledge, the Station conducted crop rotation work continuously for 30 years, 1920–1950. Crops grown on one-tenth-acre plots included winter wheat, spring wheat, barley, oats, flax, peas, peas and barley for hay, corn for silage, potatoes, crested wheatgrass, smooth bromegrass, annual and biennial sweet clover, and alfalfa. Application of manure and fertilizers were included.

Results from the rotations were of limited value. Plot design was not helpful in comparing rotations or cropping sequences. The emphasis on silage, which existed in 1920, did not exist in 1950 and later. Corn and flax proved not to be practical crops. Soil erosion by wind and perennial weeds (field bindweed and Canada thistle) were not controlled sufficiently. The restrictions on being able to change crop sequences and practices when determining the long term accumulative effects of a rotation were not compatible with the progressive agriculture of the 20th century.

Weed control: Attempts to control weeds with chemicals started as early as 1911. A solution of iron sulfate was sprayed on field bindweed; little control resulted. Some control of mustard and pigweed growing in oats and barley was obtained. The higher rates of application damaged the oats and barley. Sodium chlorate was tried as a control of field bindweed, Canada thistle, and quackgrass from 1928 through 1932. Weed control was accomplished; adverse effects for crop production persisted for 4 years. Sinox selective was tested on dead nettle in 1941.

The main conclusions from applying 2,4-D in 1946 were: young weeds were killed more easily than older weeds; don't spray alfalfa with 2,4-D; some weeds were stunted but not killed, as Canada thistle; and spraying with 2,4-D was an economical method for controlling some weeds. Intensive weed research was done from 1953 through 1955. After 1955, the responsibility for weed research in northeast Oregon was assigned to the Pendleton Experiment Station (now called the Columbia Basin Agricultural Research Center).

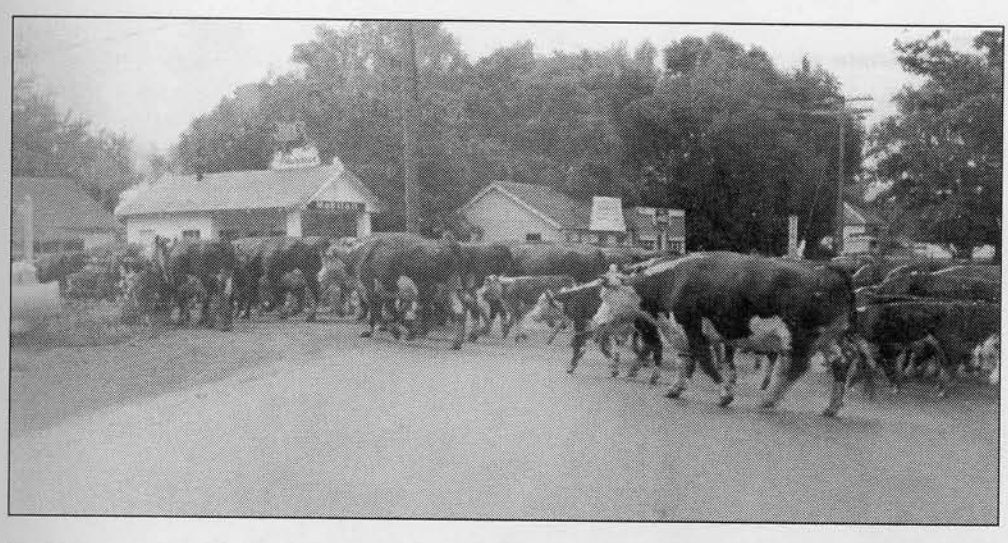

Figure 21. Trailing cattle through Union to summer range at the Hall Ranch, June 22, 1950.

Range and Forestry

The Hall Ranch proved to be an outstanding location for research in the foothills of northeast Oregon. Forage production and utilization were measured in upland meadows, open forest, and dense stagnant forest. Stands of marketable timber provided opportunities to study forest sites before and after logging. Big game, Catherine Creek, and riparian land expanded opportunities available to examine the interactions of plant-animal-water-environment. Foresighted, dynamic planning by range and forestry management personnel was an important factor in outstanding research. Graduate students were responsible for much of the work completed.

Investigations were directed toward expanding information on adaptation, seasonal productivity, utilization, and chemical composition of native and introduced species. Open forests of ponderosa pine, Douglas-fir, and pine grass produced as much forage as open meadows in the forest. Forage in the open forest was available slightly later in the grazing season and remained greener later. Forested areas with dense overstory produced little grass, forbs, and browse for summer grazing or for wintering deer and elk. Quality of forage decreased as crown cover increased. Younger cattle and cattle with previous experience in the forest grazing, utilized forage in dense crown cover and in logged areas more efficiently than cattle with no experience in the forest grazing.

Steers made gains of a pound per day on pine grass-browse forage in late

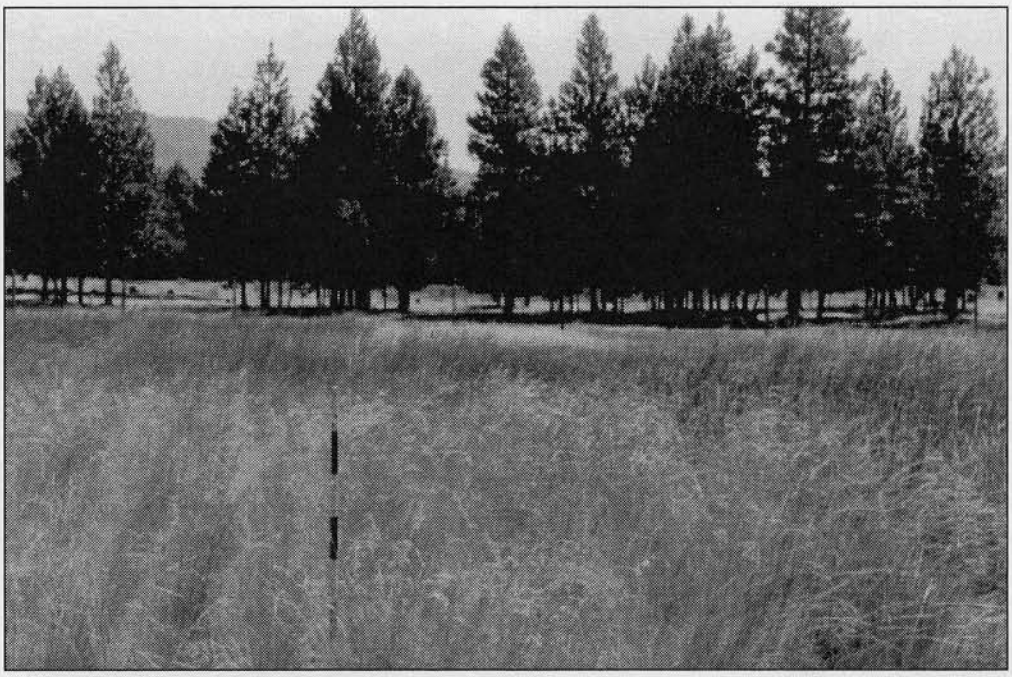

Figure 22. Whitman beardless wheatgrass and hard fescue, Hall Ranch Nursery, July 27, 1957.

spring and early summer. Gains were very little after mid-summer and especially when the summer had been hot and dry. Summer gains were inversely related to gains the previous winter, which agreed with work done decades earlier. Forage remaining after steer removal was a satisfactory feed for cows whose calves had been weaned.

Selective and clear-cut logging was done. Selective logging had a very positive effect on growth rate of remaining trees, seedling establishment, and increasing growth of grass forbs and shrubs. Yearlong browse available for big game was markedly increased.

Reproduction was confined to grand fir seedlings in diseased, stagnant forest dominated by grand fir. Good timber management practices improved establishment on ponderosa pine, Douglas-fir, and larch seedlings and increased growth of grass forbs and shrubs. Shrub growth was so robust in a clear-cut that browsing by big game was required to reduce the competition to forest seedlings from shrubs. Carex was a dominant species where grass was not seeded. Canada milk vetch *Astragalus canadensis* var. *mortonii* was an important forb. Slash and cull tree disposal was recommended for sanitation, reduction of fire hazard, and minimizing insect populations.

Seedling establishment and herbage production decreased as soil disturbance increased. Native plants increased rapidly where there was low to moderate soil disturbance. Seeding disturbed areas with grasses and legumes had several beneficial effects. The length of transition time from heavily disturbed to growing native grasses, forbs, and seedling trees was reduced. Soil erosion and invasion of unwanted species, mainly bull thistle, were reduced.

Numerous nurseries of grasses and legumes were planted in various environments, such as arid rangeland, foothill meadows, and mountain meadows. The earliest nursery was located on the slope immediately south of Hot Lake. No grass was found to be superior to the primary native grass, bluebunch wheatgrass, in forage production over a period.

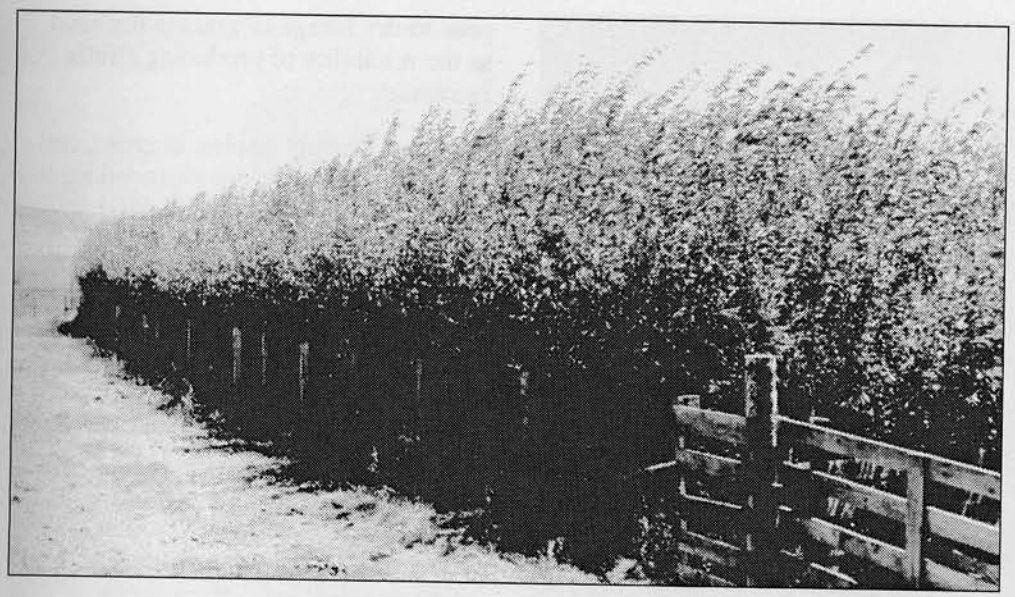

Figure 23. Excellent windbreak and shelter for livestock.

A nursery was planted in cooperation with the Forest Service in a mountain meadow near Peavy Cabin[10] soon after the Station started grazing the Crawfish allotment in 1933. Establishment, longevity of stand, and invasion by other plants were some of the information obtained. Evaluation of growth was hampered by big game over-grazing the more palatable species and those with the earlier spring growth. After 1955, most nurseries were fenced to exclude big game and cattle.

Numerous nurseries were planted on the Hall Ranch in open meadow, pine woodland sites. The first nursery was planted immediately after the ranch was purchased. Intermediate wheatgrass, hard fescue, and sheep fescue were the higher yielding, more persistent grasses. Tall fescue and crested wheatgrass were not adapted. Alfalfa was high yielding but not long-lived because of overgrazing and killing by soil heaving in late winter and early spring. Intermediate wheatgrass, timothy, and mountain bromegrass were the more productive species in a later nursery planted on Tolo soil. Fertilizer, mainly nitrogen, increased forage yield at hay stage 1,800 pounds per acre.

Forage production from fertilizing rangeland in the three northeast counties of Oregon was doubled by nitrogen fertilizer. Introduced grasses yielded approximately twice what native grasses did and were more responsive to fertilizing. Forage fertilized with nitrogen had a higher protein content than forage that was not fertilized with nitrogen. Practically no residual nitrogen response occurred in any fertilizer trial. The value of the increased forage at hay stage of growth from fertilizing and the cost of fertilizing were about equal; thus, there was no definite positive financial return for fertilizing rangeland.

In 1912, the Station cooperated with the Oregon State Board of Forestry in an experimental tree planting consisting of seven deciduous and two evergreen species. The trees had potentials for windbreaks and homestead plantings. In 1926–1928, several thousand ornamental trees were grown for the State Highway Commission for planting along highways. A tree nursery of 25 species was grown in cooperation with the Oregon Department of Forestry in 1934–36. Windbreaks, wood lots, and shade were possible uses for the trees. A woody adaptation planting of 29 trees and shrubs was started in 1948 in cooperation with the Soil Conservation Service.

[10] Peavy Cabin is located approximately 15 miles southwest of Anthony Lake.

Figure 24. Irrigated hybrid corn grew so tall that ears were above people's heads, and it produced 35 tons of silage per acre compared with 22 tons of silage from unirrigated corn.

Vegetables and Fruit

Many kinds and varieties of vegetables were grown during the early years of the Station. The 1909–1910 biennial report states that 32 varieties of peas, 22 of beans, 20 of potatoes, cabbage, carrots, tomatoes, sweet corn, and 10 other vegetables were tested. The primary purpose was to provide bases for answering questions for home gardeners. Vegetable work declined after 1910; livestock and feed production received more attention. In the early 1920s, the Station joined the attempt to produce head lettuce commercially in the Grande Ronde Valley. In 1924, the Station sold over 500 heads of lettuce. Limited vegetable growing and seed production was done intermittently into the 1960s.

The consistent success with growing peas as a vegetable encouraged the establishment of peas on a large scale in areas with 15 inches or more annual rainfall or where irrigation was possible. The growing of peas with a cereal crop for silage or hay was recommended for many years, as was grazing of nearly mature peas by swine. The impetus for peas as dry forage or grazing declined as the reliability of producing alfalfa increased.

Small orchards of apples, cherries, and prunes were growing in scattered areas of northeast Oregon prior to 1901.[11] Numerous pests, such as codling moth, cherry fruit fly, and fire blight, were hazards to successful production. A horticulturist was assigned to the Station in 1907 to evaluate pest problems. Collecting and disseminating information on applicable management practices from other areas was expected. No major pest problems unique to the area were observed. The horticulture position was eliminated in 1910 with the idea that practices successful in other Pacific Northwest fruit growing areas would be successful in northeast Oregon.

A few fruit trees were planted on the Station in 1907. A planting of grapes was made on Ramo Flat in 1908–1909.[12] Grape production was not successful. In 1910, a larger planting of apples, cherries, prunes, pears, and stone fruits was made on the Station. Raspberries, black caps (black raspberries), blackberries, gooseberries, currants, and strawberries were planted between the rows of fruit trees. Three years of strawberry testing was completed in 1912. Varieties for home use were recommended; no recommendations were made for commercial production. Tree fruit production was not reliable from year to year because of late spring frosts and temperatures much below zero some winters. Winter killing and disease caused most of the trees to die within three decades.

Harvest methods for small fruit were rather unique but acceptable to research at the time. When fruit was ready for

[11] *Biennial Report of the Eastern Oregon Experiment Station*, 1909-1910, for varieties and areas of fruit growing.

[12] Ramo Flat is south-southeast of Union.

Figure 25a. Spinach produces an abundance of high-germinating seed under our conditions, *1942–44 Annual Report*, page 203.

Figure 25b. Dick Richards (right) shows plots during the Cattle and Horse Raiser's Convention, June 3, 1933.

harvest, local citizens were invited to pick, weigh, taste, and comment on shipping potential. The harvested produce was sold locally, with preference given to those assisting with harvest. Records indicate gooseberries were productive and in demand; 180 and 135 gallons were sold in 1920 and 1921 respectively at a price of 10 cents a gallon. In 1920, 162 gallons of currants were sold.

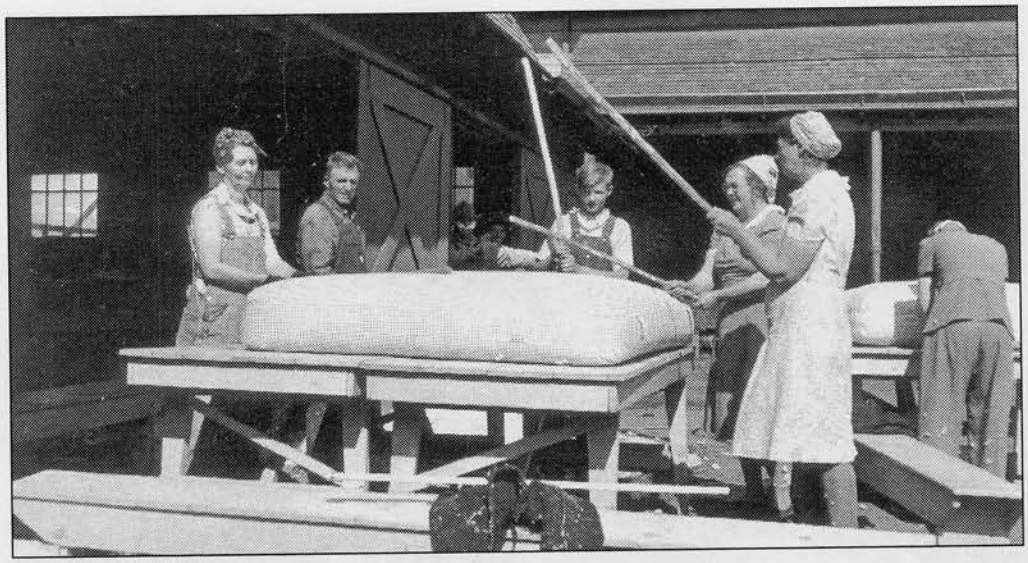

Figure 26a. Taken from the *1940–42 Bienniel Report*. The original caption reads: "The Experiment Station cooperated with Miss Marjorie Ellsworth, Home Demonstration Agent of Union County, by furnishing facilities for use in the mattress making project."

Figure 26b. The Experiment Station and the Union County Cooperative Creamery entered a 4-H Dairy Club float that won first prize in the Stock Show parade, June 1940.

Other Station Activities

A Farmers Institute[13] was held in Union in December 1901. Speakers on the program included several from Oregon College of Agriculture. The first field day was held in 1910 and proved so popular that annual field days were held thereafter. Some field days emphasized a particular subject, such as livestock, cattle, sheep and wool, or dairy. Numerous field days of show-and-tell were conducted on the Hall Ranch to show improved grazing-forestry-environment management.

The Station assisted the Oregon Railroad and Navigation Company Farming Demonstration Train by providing displays and information pertinent to the area, and occasionally personnel. The train was an annual event starting in 1906. The Union Pacific Railroad continued the train for many years.

[13] Farmers Institute was a 2-day or longer meeting where improved agricultural practices were presented and discussed.

Figure 27a. Delegation of 4-H girls' camp at the Station, 1945.

Figure 27b. A 4-H boys' club learns to identify weeds and weed seeds, 1942.

A well known activity of the Station during its early years was exhibiting samples of forages, cereals, and seed at fairs. Baker, Umatilla, Union, and Wallowa county fairs and the State Fair were common places for exhibiting. The Station contributed to Oregon's displays at major events, such as the Lewis and Clark Exposition, Chicago World's Fair, and San Francisco World's Fair.

Many groups used the Station before World War II for various events. The 1940–42 biennial report lists 4 field days, 6 picnic and field days, 3 picnic and tour days, 6 tours, 18 meetings, 2 judging contests, 1 demonstration (tractor), and 1 mattress-making project (a World War II Extension activity).

The Station provided instructors for teaching agricultural courses at Eastern Oregon College starting in 1961; beginning Crop Production and Animal Husbandry were taught. In addition, the Station has cooperated with the U.S. Weather Bureau in Portland since October 1911 in collecting meteorological data.

Figure 28. Integration of timber production and livestock grazing, Hall Ranch exclosures.

III. Period of Change and Uncertainty, 1960 to 1998

In 1957, James A.B. McArthur became superintendent. During his watch, the Station added another direction to the research program. The Hall Ranch developed from a place to graze livestock to an active research location. McArthur developed professional relationships with William E. Anderson, State Range Management Specialist, Soil Conservation Service; Dr. Don Hedrick, Rangeland Resources Program, OSU; and Dr. R.E. Kenniston, College of Forestry, OSU. These men formed a team that provided the first information to provide range and cattle management for the forested lands of the interior western U.S. and Canada. Anderson provided the core management plans for the Hall Ranch. The Hedrick, McArthur, Kenniston team, along with several graduate students, produced several publications dealing with integrated management of forest practices and livestock management.

Perhaps the most significant action, one that would have important implications for forest management 40 years later, occurred in 1960. Exclosures were constructed at three locations on the Hall Ranch that excluded cattle only and cattle, mule deer, and elk. Using these exclosures, scientists identified changes in plant community composition caused by the foraging habits of herbivores[14]. These findings would drive new research directions in northeastern Oregon in the 21st century for scientists from the Union Station, Pacific Northwest Research Station, Forest Service, Boise Cascade Corporation, Oregon Department of Fish and Wildlife, and the National Council of the Paper Industry for Air and Stream Improvement.

During the 1960s and 70s, research on livestock management continued, as did the development of superior sires of beef cattle and sheep that were available for sale to northeast Oregon producers. During this period, the Hall Ranch entered a state of limbo because of the possible construction of the Catherine Creek dam on the property. Dr. Marty Vavra and Dr. Bill Krueger, Rangeland Resources Program, OSU, provided research leadership on the Hall Ranch beginning in 1971. Research was limited to short duration studies of

[14] See *Modification on Mixed-Conifer forests by Ruminant Herbivores in the Blue Mountains Ecological Province*, Robert A. Riggs et al., 2000.

Figure 29. Elk-handling facilities at Starkey. Elk, deer, and cattle from the Union Station are fitted with radio telemetry collars to track their interactions.

livestock nutrition and production on forest ranges. Maintenance of the facility was also limited due to the uncertain future. In the mid-1970s, with the collapse of the dam project, research was initiated again.

In 1974, the Eastern Oregon Agricultural Research Center was born by joining the Eastern Oregon Experiment Station (Union) with the Squaw Butte Experiment Station in Burns. Dr. J.A.B. McArthur retired in 1973. Dr. Bob Raleigh of the Burns Station became superintendent and Dr. Marty Vavra was assistant superintendent in charge of the Union Station. Dr. Ralph Phillips was hired as an animal scientist. This unification was the result of the findings of a "Blue Ribbon Committee" appointed by the 1971 Oregon Legislature to review the Branch Stations statewide.

In 1977, a long-term research relationship with the Pacific Northwest Research Station, Forest Service LaGrande location was initiated at the Starkey Experimental Forest and Range. This research dealt with cattle grazing systems on forest range with emphasis on compatibility with riparian recovery and sustainable livestock production.

In 1978, exclosures were constructed in the riparian areas of Catherine Creek and a research-based sustainable grazing system was initiated. These exclosures and the established grazing system illustrated that livestock grazing and riparian recovery were compatible.

The economy of Oregon took a severe downturn in the early 1980s with economic distress in both the agriculture and forest industries. Appropriations to the Branch Station system declined significantly, and three branch stations in Oregon were selected to close. Union was one of those stations.

The Union Station Advisory Committee met with Dr. Jack Davis, director of the Agricultural Experiment Station, at the Union Station. After a lengthy meeting, during which the value of the location was discussed, it was agreed not to close the station. However, the budget reduction allocated to EOARC was totally absorbed by the Union Station. The animal scientist position, held by Dr. Ed Lanka, was eliminated, the secretary was reduced to halftime, and two support positions were cut. The station's sheep operation was discontinued due to the lack of funds and labor to support it. By 1983, the budget picture had improved somewhat, and a research assistant in range management was added.

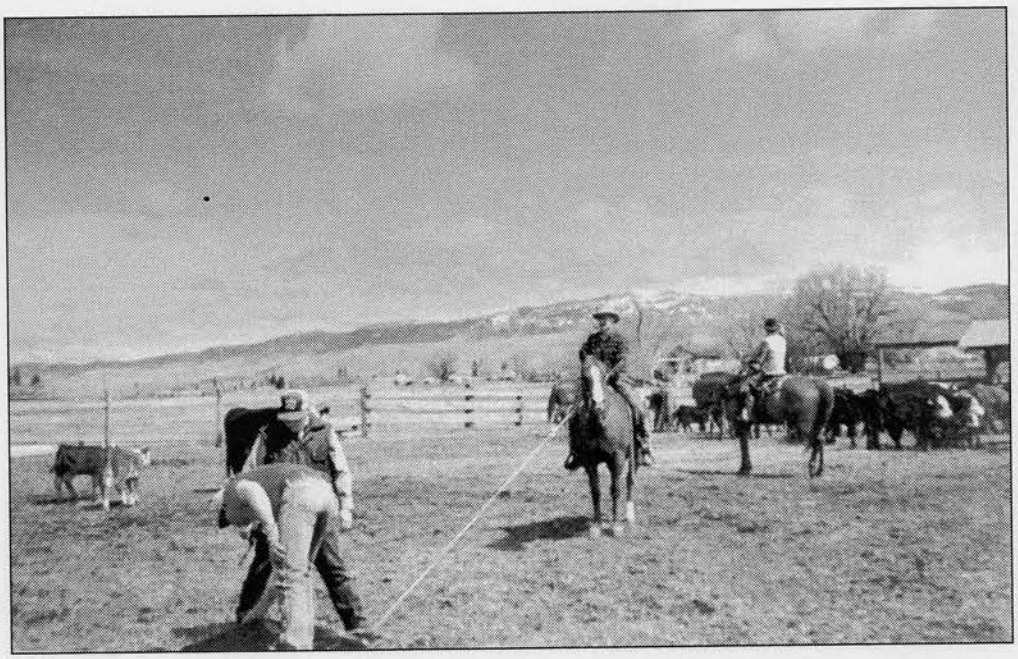

Figure 30. Even with reduced research and staff, ranching continued. Here Dr. Marty Vavra, superintendent, holds a calf while Tim DelCurto and Ron Slatter vaccinate.

In 1984, Dr. Bob Raleigh stepped down as superintendent and Dr. Marty Vavra assumed that role and moved to Burns. That left no scientist at Union. During this period, some research had been conducted cooperatively with the Animal Science Department at OSU, and research continued on the Hall Ranch and at Starkey. In 1985, an extensive research project on timber harvest and livestock and wildlife grazing was developed. Data collection on this project continues today.

With no scientist at the Union location, the University partitioned the OSU staff FTE at the Burns Station so that researchers were to conduct research at the Union and Burns locations. While this concept seemed appropriate on paper, in reality most scientists will concentrate their efforts at the location in the closest proximity. In addition, researchers working within a discipline that focuses on an ecosystem and/or set of environmental constraints find it difficult to focus on two sites with very different climates, ecosystems, and agricultural production systems. Nevertheless, scientists at the Burns location conducted research at the Union location until 1993.

Led by Dr. Marty Vavra, EOARC staff pursued avenues to increase staffing at the Union location. In 1991, a 4-year term project was funded by the College of Agricultural Sciences to increase research efforts at the Union Station. Dr. Dennis Sheehy was hired for the 4-year term position to conduct research evaluating big-game/livestock interactions and impact of cattle on public land allotments. In addition, in 1993, Dr. Tim DelCurto was transferred from Burns to Union to continue evaluating sustainable grazing systems and winter nutritional management of beef cattle.

While the decade of the '90s reflected a dramatic increase in research activities at the Union Station, recurring problems still existed. Specifically, funding continued to plague the location and limit research activities. During this period, the recurring funds (State and federal funds) allocated to the Union Station did not even support existing salaries that included only one scientist and 4.75 support staff. In fact, livestock/timber sales and grants represented greater than 50 percent of the overall funding to the Station. As a result, livestock/timber sales and grants determined and/or limited the level of staffing, graduate student support, capital improvements, and research funding potential.

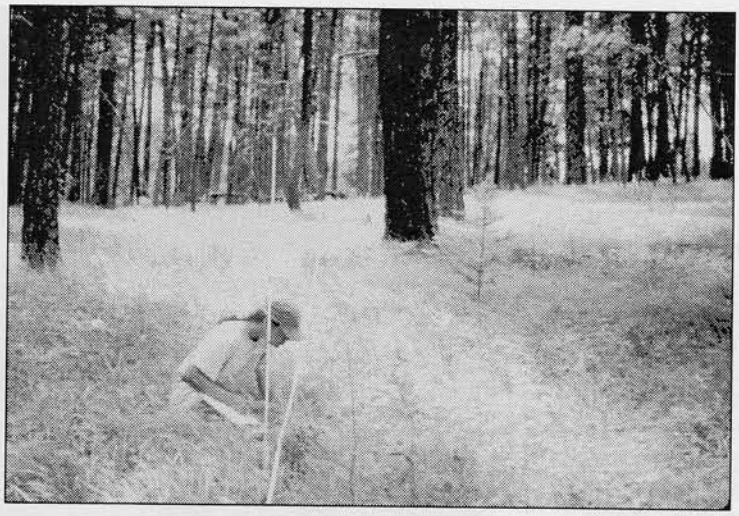

Figure 31. Integrated Production Alternatives (IPA) project. Compare the July 19, 1988 photo point (left) with the June 16, 1997 photo point (above), after almost 10 years of grazing management.

By the late '90s it became apparent that the research efforts and staffing at the Union Station could not be supported with the existing funding arrangement. In response to the funding limitation, the Advisory Board for the EOARC (with responsibility for both the Burns and Union locations) met with the specific agenda of discussing how to handle the funding shortfalls at Union. Several possibilities were discussed which included reducing staff and research efforts at Union while moving research FTE back to the Burns location, and how to increase funding and staffing for the Union Station location. The direction provided by the advisory board was to pursue all possible modes to increase funding for the Union location. However, if increased revenues were not realized in the immediate future, reduced staffing would be initiated.

Three programs were developed from the advisory meeting. First, an Advisory group specific to the Union location was assembled. Second, an endowment fund was developed for the Union Station with the specific goal to help support research and capital improvements. Third, a proposal was developed with the input of the Union Station Advisory Committee to increase research efforts, support staffing, and provide additional funding for research activities.

After several Advisory meetings and coordination with the College of Agricultural Sciences, the plan for the Union Station included pursuit of funds for four additional research scientist, four additional research support positions, and funds to pay for service and supplies associated with increased research activities. In turn, the College of Agricultural Sciences included the Union Station request in a legislative package to increase funding and program efforts for the Agricultural Experiment Station and Extension efforts statewide. The entire package request totaled approximately $20 million.

The 1999 legislature approved the additional funding of approximately $14 million for the College of Agricultural Sciences. The portion allocated to the Union Station amounted to $900,000 for a 2-year period. The money was targeted specifically for research focused on Natural Resources and Livestock Production in the northeastern Oregon region. While the allocation to the Union Station was short of the original request, the funding did provide for the filling of three research scientist positions, three support staff, and increased costs associated with increased research activity.

Figure 32. The North Grande Ronde Elk Project, funded in part by the Rocky Mountain Elk Foundation, has goals to reduce damage to agricultural lands and improve use of public lands.

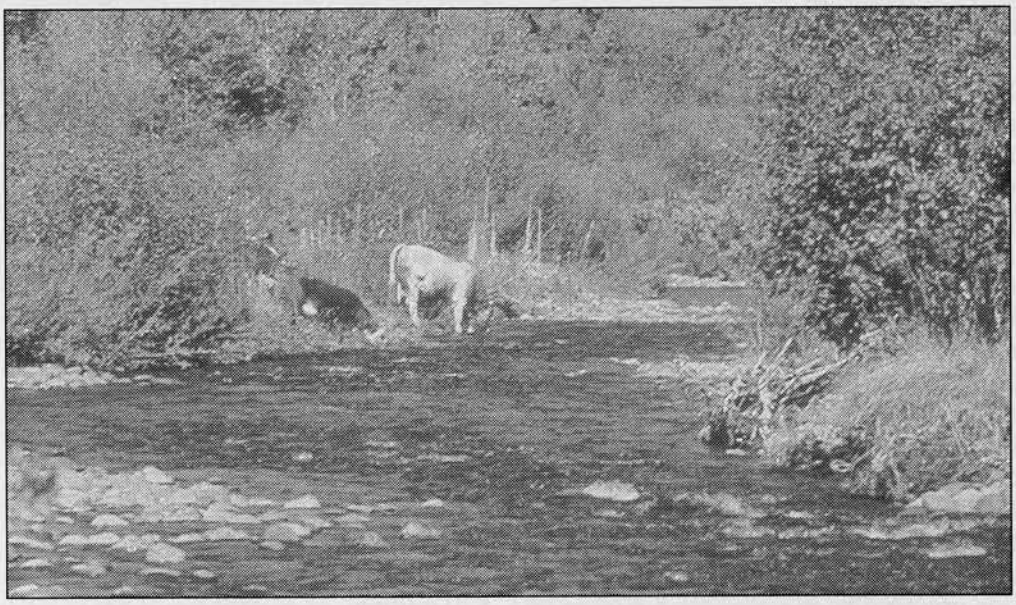

Figure 33. Studying the impacts of livestock grazing on riparian areas at Hall Ranch.

IV. Current Status and Future Outlook

Currently, the Union Station is in the final stages of implementing the staffing provided by the 1999 legislature. Three additional scientists have been hired, and two of three support staff positions have been filled. In addition, significant salary savings were realized because of the time delay between the allocation of funds and the filling of the staff positions. This delay was unavoidable due to the significant amount of time needed to develop position descriptions, conduct regional and national searches, screen applications by committees, interview final candidates, and, ultimately, hire/fill the new positions.

The salary savings, in turn, have provided the Union Station (with support and direction from the Union Station Advisory Committee) the resources to initiate some much needed facilities improvements to augment the staff changes fully. Specifically, the Union Station recently has completed the final stages of building a "state-of-the-art" vegetation and forage analysis laboratory. This laboratory will allow several types of laboratory analysis that include

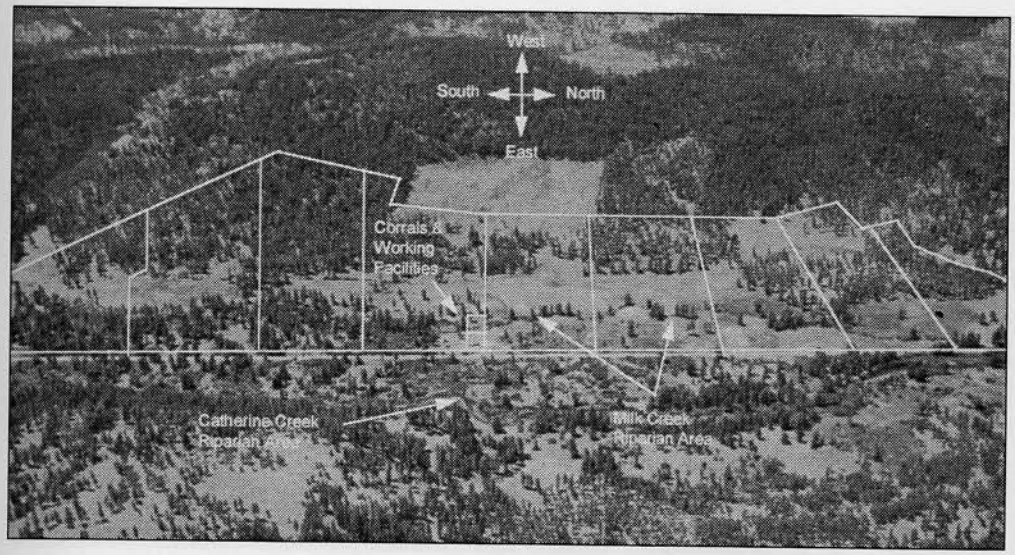

Figure 34. State-of-the-art computer equipment offers new technologies. This aerial photo of the Hall Ranch has GIS information added that shows the location of research pastures.

gas chromatography, atomic absorption spectrophotometry, visible spectrophotometry, kjeldal nitrogen analysis, and standard forage chemistry analysis. The renovated laboratory also includes graduate office space, computer rooms, and additional workspace for increased research efforts.

Funds also were allocated to remodel the office building and build an addition that provides three more offices, handicap accessible restrooms, and a meeting room capable of supporting up to 50 people. The office space will be sufficient to house the new staff and increased graduate student numbers that will result from the larger research staff. The meeting room will be critical for outreach activities. It also will provide instructional space for OSU Agriculture Program students and be available for other public uses and needs. The architectural design of the addition was prepared carefully to blend with the characteristics of the original office building, which is currently on the City of Union's historical building registry. This project is currently underway with an expected completion date of June 1, 2002.

Most important to the mission of the Union Station, however, is the increased research staff and research support funds. Dr. John Tanaka was hired July 1, 2000. Dr. Tanaka is an Associate Professor with expertise in Natural Resources and Public Land Policy. As an associate professor, Dr. Tanaka provides the Union Station with a proven scientist, a solid publication and grants record, with well-established ties to public land agencies and natural resource issues important to the agricultural industry in northeastern Oregon. Dr. Tanaka is involved with many important activities that include: being a member of the John Day/Snake River Resource Advisory Committee, serving on the Board of Directors for the Society of Range Management, taking a lead role in developing the Policy Analysis Center for Western Lands, and actively working as an interdisciplinary team member on numerous projects evaluating land and livestock management in rangeland settings.

Dr. Gary Pulsipher came to the Union Station January 1, 2001. Dr. Pulsipher currently is developing a research program to evaluate sustainable beef production systems. His research will focus on winter nutrition and reproductive success, as well as management systems for economic sustainability of beef production in the western U.S. Dr. Pulsipher has a solid applied background and the fundamental training to make substantial contributions to the Union Station and constituents that the University serves.

The last research scientist position has been filled just recently. Dr. Patricia Kennedy will begin with the Union

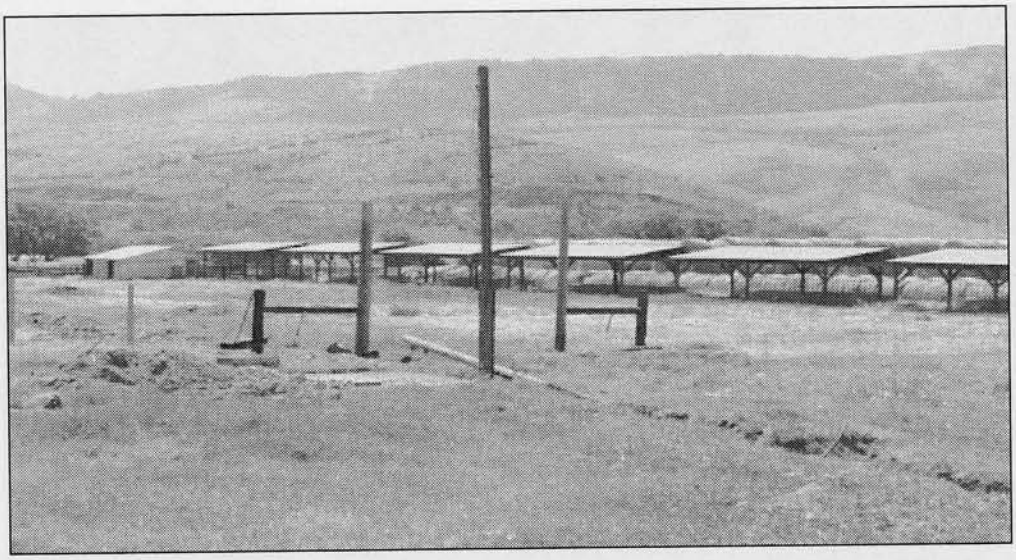

Figure 35. New feedlot facilities under construction for conducting winter nutrition studies.

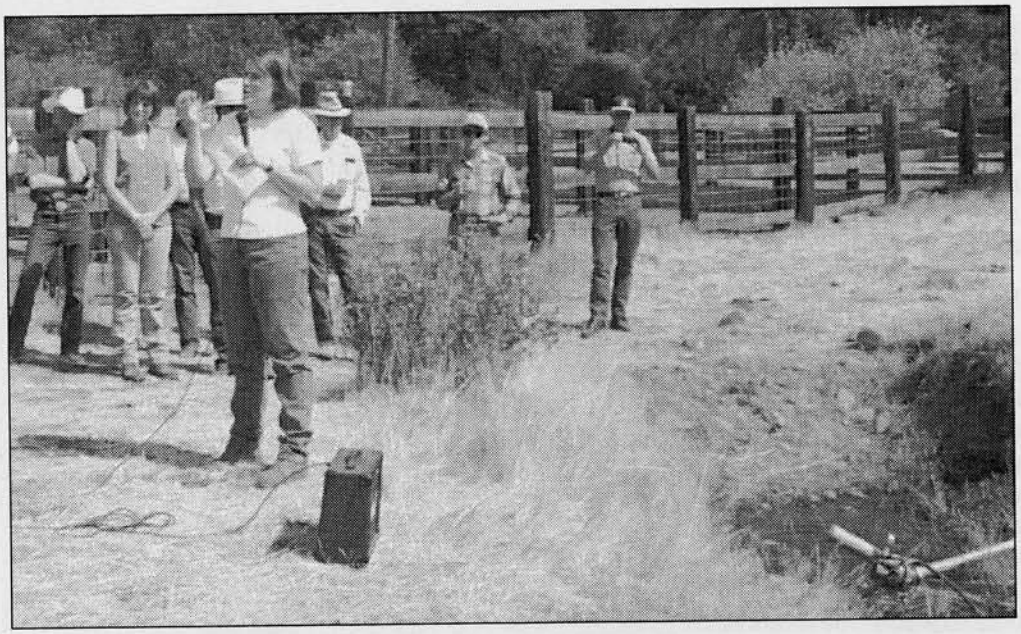

Figure 36. Marni Porath, OSU Extension agent in Lake County, explains the research she conducted as a graduate student at the Hall Ranch that looked at off-stream watering and salt for better distribution of animals to reduce the impact on riparian areas.

Station January 1, 2002. Dr. Kennedy will provide research expertise that will cover wildlife biology and ecology. Dr. Kennedy's specialty is ornithology (study of birds), with specific expertise on how land management decisions and ecosystem changes influence the sustainability of specific bird populations. With Dr. Kennedy, the Union Station also is gaining an established research scientist with a solid reputation for doing cutting-edge research that is applicable to the long-term sustainable management of both private and public lands.

The "future-outlook" for the Union Station is best described as bright and promising. Actions by the Advisory Board, funding provided by the Oregon legislature, and the acquisition of the new science staff promises to pay dividends for years to come. The interdisciplinary team being developed at the Union Station will be well equipped to address many issues challenging beef cattle production, wildlife management, timber, and land management in northeastern Oregon. In addition, this group of scientists, committed to work cooperatively with the USDA Forest Service and Oregon Department of Fish and Wildlife

researchers currently associated with the Range and Forest Science Laboratory, and with northeastern District staff, has unlimited opportunities to conduct meaningful and cutting-edge research.

The opportunity for the Union Station staff to interact with the successful OSU Agriculture Program at Eastern Oregon University (EOU) is also a promising relationship. The additional staff at the station will be able to provide additional courses in the Agriculture Program that will provide greater diversity of class offerings, and the potential to develop additional curriculum and degree programs that may add to the success of the program. In turn, the OSU Agriculture Program provides the Union Station Staff with the opportunity to teach and bring regional research into an educational atmosphere that focuses on regional students and needs. The interaction with the students will provide the Union Station with opportunities to involve students in research activities and summer internships, and to provide graduate educational experiences. The OSU faculties at EOU are resources for further collaboration and expertise as they relate to research being conducted in northeastern Oregon.

The future success of the Union Station, however, will hinge on being innovative and focused on issues important to the region. Over the last 100 years, agriculture has changed dramatically. While it might seem impossible to

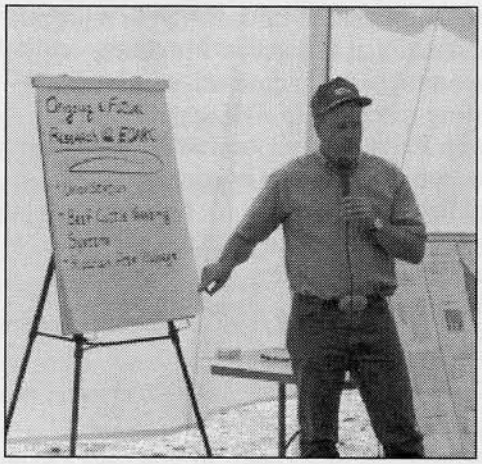

Figure 37. Dr. Timothy DelCurto, assistant superintendent at the Union Station, during 1999 Field Day at Hall Ranch.

conceive, the 21st century likely will see as dramatic a changes as happened during the 20th century. In the past 100 years, the research and activities at the Station have reflected these changes. As we enter the 21st century, current issues with production agriculture, particularly in terms of economic and ecological sustainability, will provide the Station staff and cooperators with a variety of researchable issues. The goal of the station will be to provide research that will help production agriculture stay competitive in a world market, and to provide ecological research that allows policy makers the opportunity to make environmental decisions relative to public and private land management that are founded in science.

To reach these objectives, the Union Station will continue to utilize an

Advisory Committee to help with research and staffing direction, as well as establishing priorities for research and outreach efforts. In addition, it will remain important to publish research in popular press, regional and national meetings, and scientific journals representing a diversity of disciplines and interest. While these articles are quite diverse and require a substantial range in communication skills and strategies, the application of the research only will be realized truly if dissemination efforts are maximized.

It is also important for the Union Station to continue its close relationships with University Extension programs in the dissemination of information to regional and national audiences. Providing opportunities for outreach education, being receptive to FTE appointments with Extension responsibility, and being receptive to diverse opinions and audiences are needed for long-term success. Ecological research particularly in relation to grazing of public lands, timber production, agriculture/water relations, and agricultural influences on wildlife populations, needs to be focused so that the research is meaningful and acceptable to diverse audiences. Being objective and credible to diverse audiences will be a guiding goal in the design, implementation, and interpretation of research data. The greatest application of our research, and greatest benefit of the funds invested in the Union Station, will be achieved only by being credible across a variety of disciplines and interest. With the current facilities, staff, and resources available in the northeastern region of Oregon, the Union Station is poised for success.

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Appendix 1

Letter to D.E. Richards (Superintendent 1932–1945) from George F. Hall (probably 1943)

To D.E. Richards,

Thinking you might be interested in knowing some of the history of the Eastern Oregon Experiment Station. Thought I would write some of the facts concerning its origin.

During the term of Governor Penoyes, a bill was introduced by Senator Matlock in the Legislature of 1893 which provided for the establishment of a Branch Insane Asylum to be located in Eastern Oregon, the place to be selected by the board of Commissioners, consisting of the Governor, Sec. of State, and State Treasurer, but owing to a similar case, then pending in the courts, nothing further was done until the following year.

Then, after a thorough investigation by the board of different cities that sought the institution, the board decided in January 1894, upon a site adjoining Union. Naturally our citizens were greatly pleased with the prospect of this state institution, being established in Union. Then immediately following the decision of the board, suit was brought in the circuit court of Marion County, against the board, by the State responded by A.C. Taylor, and an injunction served, to restrain them from purchasing the land, owing to a clause in the State Constitution which prohibited the establishment of state institutions outside the capital at Salem.

After a considerable length of time in which this Bill was wrangled through the court, it was finally decided in favor of the decisions of the state board, and Governor Penoyer, Secretary of State McBride and State Treasurer Melchian, purchased the site selected at Union at a consideration of $25,000, but decided to leave the completion of the project to Gov. York's administration. The feeling around the capital so strongly opposed this measure that it was again thrown into the courts, with the result that the building of the asylum on this site was defeated, until the State Constitution should be amended. By conditions of the original Bill, if this appropriation was not used within two years, it would revert back to the state. Through the influence of Eastern Oregon representatives in the State Legislature, additional time was granted and thus it gave our townsmen a chance to work for something else.

Several Union citizens who personally aided in the project have since passed away. First the idea was conceived that we might secure a Branch Agricultural College to be located on this site, so we decided to try for it, and, in consequence a Committee, composed of the following citizens was appointed. S.A. Purcel, Thomas Brashen, and Geo F. Hall, to solicit funds, to send a group of Union citizens to Salem to present the project to the Legislature. Other members of this group were, W.F. Wright, J.M. Carroll, E.W. Davis and L.J. Davis. At Salem we met strong opposition from the Board of Regents of the State Agricultural College, these being, James A. Withycombe, J.K. Weatherford, Col. Apperson and the members of the staff, none of whom would indorse the plan, so all our men were badly discouraged. Most to the giving up place, in fact Mr. Wright, Pres. of the First Nat. Bank, returned home. Later I got in touch with W.P. Cady, a member of the Legislature, whom I had personally known before and he told me that they had suggested to Mr. W.J. Wright, that if it were properly put up to the regents of the State Agricultural College, they might consent to the establishment of an Experimental Station on the site that had been purchased by the State.

As the session of the legislature adjourned on Friday until Monday a.m. most all the Legislators and Lobbyists left for Portland for the weekend. On the train that evening, I talked with our group, about the suggestion of Sen. Cady and they thought best that we contact him as soon as possible on this matter. Which we did on the following morning. E.W. Davis and I were asked to do this, as the others of our group had just had a very heated argument with the board at Salem. Sen. Cady advised us to return to Salem with him on Sunday, and that he would have the Attorney General draw up the Bill for Monday morning, which he did. Then Mr. Cady asked the regents of the State Agricultural College for their consideration of the Bill, and to our surprise it met with their approval, so we finally got the Bill through. Thanks were due W.P. Cady, for making this project a reality. In 1901 the Legislature appropriated $10,000 for the establishment of The Eastern Oregon Experiment Station on its present site at Union.

The Board first sent Professor Lee Kimby here to organize the work. He was later followed by George Gammie, a practical farmer and stockman. On his retirement, the next Superintendent appointed was the late Robert Withycombe, who worked consistently and efficiently until removed by death. Then came its present Superintendent, D.E. Richards, who has further advanced the fine reputation of the Station, and by his excellent management given to it its fine financial rating. In its success and far reaching benefit to the agricultural and stock raising interests of the State, our citizens can feel a just-pride as, personally, I do, in having been privileged to help locate the Eastern Oregon Experiment Station at Union. Hail to you Dick, and good luck,

Geo F. Hall

Appendix 2

Professional Personnel, Area of Expertise, and Years at Eastern Oregon Agricultural Research Center–Union

Name	Area of Expertise	Years
Leckenby, A.B.	Superintendent	1901–1904
Gammie, George	Superintendent	1904–1906
Withycombe, Robert	Superintendent	1906–1931
	Assistant to Superintendent	1901/02–1906
Clark, C.C.	Acting Superintendent	1907–1909
Rieben, George	Horticulture	1907–1911
Spillman, Paul H.	Assistant Superintendent	1908–1910 1915–1916
Jensen, N.C.	Assistant Superintendent	1913–1914
Morgan, V.C.	Assistant Superintendent	1920–1921
Edwards, Floyd M. B.S.	Asst. Animal Husbandman	1924–1929, 1931
Walker, Arthur H.	Farm Crops	1927–1929
Richards, Dick E.	Superintendent	1932–1944
Hand, J. Douglas	Farm Crops	1937–1939
Minnick, Kenneth	Farm Crops	1938–1945
Avery, Harry G.	Superintendent	1945–1956
Johnson, Joe B.	Animal Husbandry	1946
McNeal, F.H.	Farm Crops	1946
McKennon, Russell M.	Assistant Superintendent	1947–1948
Pierce, Cecil D.	Animal Husbandry	1950–1955
Crowley, George R.	Agronomy	1952–1955
McArthur, Jack A.B.	Superintendent, Animal Husbandry, Range Management	1956–1973
Pumphrey, Floyd V.	Agronomy	1957–1970
Eller, B. Ray	Animal Husbandry	1961–1969
Crawford, Jim C.	Animal Husbandry	1969–1970
Prescott, Allan N.	Animal Husbandry	1971–1971
Vavra, Martin	Superintendent Range Management/Animal Sci.	1973–present 1971–present
Sheehy, Dennis	Range Management	1991–1994
DelCurto, Timothy	Assistant Superintendent/ Animal Science	1993–present
Tanaka, John	Economist	2000–present
Pulsipher, Gary	Animal Science	2001–present
Kennedy, Pat	Aquatic/Terrestrial Ecologist	Will begin in 2002

Appendix 3a

OSU Agricultural Experiment Station Special Reports, Bulletins, Technical Bulletins, and Annual Reports Published by Personnel at Eastern Oregon Agricultural Research Center–Union

1902–03

Bulletin #1
Sugar beet speculation
A.B. Leckenby

1907

Superintendent's report
A synopsis of experimental work carried on the eastern Oregon Experiment Station during the year 1906
Robert Withycombe

1910

Circular Bulletin No. 8[a]—March 1910
Improved Agriculture Practices
Livestock the basis of agricultural prosperity
James Withycombe
Tillage and cropping methods for the eastern Oregon dry farmer
H.D. Scudder
Soil fertility
C.E. Bradley
The home orchard in eastern Oregon
C.I. Lewis
Better cows
F.L. Kent
Poultry on the farm
James Dryden
Circular Bulletin No. 10
Productive Qualities of Fowl
J. Dryden, Robert Withycombe, H.D. Scudder, C.E. Bradley, C.I. Lewis, and F.L. Kent

1911

Circular Bulletin No. 18
The hog and field pea special
Robert Withycombe (James Withycombe and E.L. Potter)

Col. Series 1, Number 48—January 1911
Biennial report of Eastern Oregon Experiment Station 1909–1910
Robert Withycombe

1915

Superintendent's Report
Report of the eastern Oregon branch experiment station for 1911–12
Robert Withycombe
Superintendent's Report
Report of the Eastern Oregon Branch Experiment Station for 1913–14
Robert Withycombe

Station Bulletin No. 127—March 1915
Experiments in swine feeding
James Withycombe, Ermine L. Potter, and George R. Samson

1919

Results of experiments in cattle feeding at the Eastern Oregon Agricultural Experiment Station, Union, Oregon
Robert Withycombe

Station Flyer
Results of experiments in cattle feeding
Robert Withycombe

Station Flyer
Results obtained from feeding experiments with swine

1920

Station Bulletin 174—August 1920
Fattening steers
E.L. Potter and Robert Withycombe

Station Bulletin 175—September 1920
Fattening lambs—shelter versus open lot
Robert Withycombe and E.L. Potter

1921

Station Bulletin 182—September 1921
Growing steers
E.L. Potter and Robert Withycombe

Station Bulletin 183—September 1921
Shelter and warm water for fattening steers
E.L. Potter and Robert Withycombe

Station Bulletin 184—September 1921
Silage for fattening lambs
Robert Withycombe and E.L. Potter

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[a] Written especially for distribution on Farming Demonstration Train in Baker, Union, and Columbia Basin counties.

1922
Station Bulletin 193—August 1922
Fattening steers
E.L. Potter and Robert Withycombe

Director's Biennial Report 1920–1922—August 1922
Oregon Agricultural College Experiment Station—
Director's Biennial Report 1920–1922

1924
Station Bulletin 204—May 1924
Spring crops for eastern Oregon
David E. Stephens, Robert Withycombe and
Obil Shattuck

Director's Biennial Report 1922–1924—August 1924
Oregon Agricultural College Experiment Station—
Director's Biennial Report 1922–1924

1925
Station Bulletin 219—September 1925
Cost of producing mutton and wool on eastern Oregon ranges
E.L. Potter and H.A. Lindgren

Station Bulletin 220—November 1925
Cost of producing beef on the ranges of eastern Oregon
E.L. Potter

Station Circular 62—July 1925
Costs and profits of sheep on irrigated farms
E.L. Potter and R. Withycombe

1926
Station Bulletin 224—September 1926
Wintering stock steers
E.L. Potter and Robert Withycombe

Director's Biennial Report 1924–1926—October 1926
Oregon Agricultural College Experiment Station—
Director's Biennial Report 1924–1926

1928
Director's Biennial Report 1926–1928—September 1928
Oregon Agricultural College Experiment Station—
Director's Biennial Report 1926–1928

1930
Station Bulletin 271—November 1930
Deferred breeding of beef cows
Robert Withycombe, E.L. Potter, and F.M. Edwards

Director's Biennial Report 1928–1930—September 1928
Oregon Agricultural College Experiment Station—
Director's Biennial Report 1928–1930

1931
Station Circular 101—January 1931
Winter rations for the farm flock in eastern Oregon
Robert Withycombe, F.M. Edwards, and E.L. Potter

Station Bulletin 276—May 1931
Fattening calves and yearlings
E.L. Potter, Robert Withycombe, and F.M. Edwards

1932
Circular of Information 74—October 1932
The Columbia basin foot rot of the winter wheat
Roderick Sprague

1933
Station Bulletin 311—March 1933
Maintaining fertility of Grande Ronde valley soils
W.L. Powers and D.E. Richards

1936
Circular of Information 135—January 1936
Lamb fattening trails—1935
D.E Richards

Extension Bulletin 494—November 1936
Crested wheat grass in eastern Oregon
E.R. Jackman, D.E. Stephens, and D.E. Richards

1939
Extension Bulletin 527—June 1939
Marketing the surplus wheat of the Pacific Northwest through livestock
E.L Potter and H.A. Lindgren

1940
Station Bulletin 370—April 1940
Fattening lambs on Oregon feedstuffs
D.E. Richards

Station Circular 137—November 1940
Surplus wheat feeding experiment in Oregon
John C. Burtner, Extension Editor

Circular of Information 218—May 1940
Surplus wheat for fattening cattle in eastern Oregon
D.E. Richards

Biennial Report—1938–1940 for Eastern Oregon Livestock Branch Experiment Station, Union, Oregon—December 1940
D.E. Richards

1941
Extension Bulletin 582—November 1941
Feeding wheat to hogs
H.A. Lindgren, A.W. Oliver, and D.E. Richards

Station Report—*November*
List of research projects, which have been completed and closed since establishment of department Eastern Oregon Livestock Branch Experiment Station, Union, Oregon
D.E. Richards

1942
Circular of Information 277—June 1942
Saving Oregon's ewes and lambs, pregnancy disease of ewes
O.H. Muth, J.N. Shaw, and D.E. Richards

Biennial Report—1940–42 for Eastern Oregon Livestock Branch Experiment Station, Union, Oregon—September 1942
D.E. Richards

1945
Station Bulletin 431– October 1945
Palatability for sheep and yield of hay and pasture grasses at union, Oregon
D.E. Richards and Virgil B. Hawk

Biennial Report—1942–1944 for Eastern Oregon Livestock Branch Experiment Station, Union, Oregon
D.E. Richards

1946
Biennial Report—1944–1946 for Eastern Oregon Livestock Branch Experiment Station, Union, Oregon
H.G. Avery

1954
Station Technical Bulletin 33—July 1954
Rate and efficiency of gains in beef cattle, II. Some factors affecting performance testing
Cecil D. Pierce, H.G. Avery, Martin Burris, and Ralph Bogart

1959
Miscellaneous Paper 86—November 1959
Sheep and wool days' summary of reports, Corvallis
Lamb feeding studies, p. 11
D.C. Church, C.W. Fox, J.A.B. McArthur
Aim and shoot for efficient sheep production. p. 18
C.W. Fox

1960
Miscellaneous Paper 92—May 1960
Summary of reports...beef cattle day, Corvallis
Beef cattle investigations, Union Station, p. 18
J.A.B. McArthur

Miscellaneous Paper 99—October 1960
Summary of reports...sheep and wool day, Corvallis
Results of OSC sheep breeding research, p. 13
C.W. Fox, J.A.B. McArthur, and Ralph Bogart
Semen testing of rams for predicting fertility, p. 18
S.H. Wu and C.W. Fox

1961
Circular of Information 610—October 1961
Winter wheat fertilization in northeast Oregon
F.V. Pumphrey

Miscellaneous Paper 121—November 1961
Summary of reports... sheep and wool day, Corvallis
Responses obtained from selecting for traits of economic importance
C.W. Fox, J.A.B. McArthur, Ralph Bogart

1962
Miscellaneous Paper 132—May 1962
Summary of reports...beef cattle day, Corvallis
Beef cattle breeding research at Oregon State University, p. 3
Ralph Bogart
Wintering levels for replacement cattle, p. 9
J.A.B. McArthur
Value of range research in beef cattle improvement, p. 10
D.W. Hedrick

Circular of Information 614—November 1962
Performance of barley, oats, and wheat varieties in Umatilla, Union, and Wallowa counties
Charles R. Rhode

1963
Special Report 147—May 1963
Summary of reports... 1962 sheep and wool day, Corvallis
Feeding linear-programmed rations to lambs, p. 5
E.R. Eller and J.A.B. McArthur
Reproductive performance of crossbred and purebred ewes, p. 18
C.W. Fox and J.A.B. McArthur
Sire evaluation determined by carcass value of offspring, p. 22
C.W. Fox and J.A.B. McArthur

Special Report 152—May 1963
Summary of reports...livestock field day, Eastern Oregon Experiment Station, Union
Wintering replacement heifers for beef production
J.A.B. McArthur and B.R. Eller

Special Report 152—May 1963 (cont.)
Comparison of Columbia and Targhee sheep managed for farm flock production
B.R. Eller and J.A.B. McArthur
Increasing wool production by selection and management
B.R. Eller and J.A.B. McArthur
Reproductive performance from crossbred and purebred ewes
C.W. Fox and J.A.B. McArthur
Evaluation of rams as determined from a carcass evaluation of their offspring
C.W. Fox and J.A.B. McArthur
Current beef cattle research at the Eastern Oregon Experiment Station
J.A.B. McArthur and B.R. Eller
Other research in sheep management
B.R. Eller and J.A.B. McArthur
Selecting and performance testing rams
B.R. Eller and J.A.B. McArthur

Special Report 163—November 1963
Summary of reports...1963 sheep and wool day, Corvallis
Increasing wool production by selection and management, p. 3
B.R. Eller and J.A.B. McArthur
Comparison of production from Columbia and Targhee sheep managed under farm flock conditions, p. 4
B.R. Eller and J.A.B. McArthur
Sire variations in carcass and eating quality from weanling lambs, p. 14
C.W. Fox, W.H. Kennick, J.A.B. McArthur, and B.R. Eller

Circular of Information 619—August 1963
Sulfur and phosphorus fertilization of alfalfa and clover in northeast Oregon
F.V. Pumphrey

1964
Special Report 175—May 1964
Summary of reports... sixth annual beef cattle day, Corvallis
Effect of sex condition on growth, finishing, and meat characteristics of beef animals, p. 6
W.H. Kennick, A.T. Ralston, and J.A.B. McArthur

Special Report 177—May 1964
Summary of reports... livestock field day, Union
High yields of quality alfalfa, p. 1
F.V. Pumphrey
The effect of time of castration on suckling growth, feedlot performance, and carcass characteristics of beef animals, p. 5
J.A.B. McArthur, B.R. Eller, and W.H. Kennick
The effect of time of supplemental winter-feeding on pregnant ewes, p. 10
B.R. Eller and J.A.B. McArthur

Special Report 177—May 1964 (cont.)
Selection for certain wool characteristics, p. 16
C.W. Fox
Current research in beef cattle management, p. 19
J.A.B. McArthur and B.R. Eller
Current research in management and feeding of farm-flock sheep, p. 21
B.R. Eller and J.A.B. McArthur

1965
Presentation Field Day—March 1965
Vitamin A injections and calf scours in northeastern Oregon
B.R. Eller and J.A.B. McArthur

Special Report 192—May 1965
Summary of reports... seventh annual beef cattle day, Corvallis
Crossing lines of cattle within a breed, p. 13
Ralph Bogart
Station Technical Bulletin 84—June 1965
Seasonal yield and chemical content of forage mixtures on a pine woodland meadow site in northeastern Oregon
D.W. Hedrick, J.A.B. McArthur, J.E. Oldfield, and J.A. Young

Station Bulletin 600—August 1965
Forty years of testing... grass and legume varieties
H.H. Rampton

Station Bulletin 601—September 1965
Fertilizing Kentucky bluegrass and fine fescue for seed production in northeast Oregon
F.A. Pumphrey

1966
Special Report 215—May 1966
Summary of reports...eighth annual beef cattle day, Corvallis
Forest grazing in northeastern Oregon, p. 13
Donald W. Hedrick

Special Report 217—May 1966
Summary of reports...livestock field day. Eastern Oregon Experiment Station, Union
Wintering pregnant beef cows in northeastern Oregon
J.A.B. McArthur and B.R. Eller
Vitamin A injections and calf scours in northeastern Oregon
B.R. Eller and J.A.B. McArthur
Other current cattle research
J.A.B. McArthur and B.R. Eller
Effect of thibenzole upon the feedlot performance of lambs
B.R. Eller, J.A.B. McArthur, and S.E. Knapp
Other current sheep research
B.R. Eller and J.A.B. McArthur
More hay per acre
F.V. Pumphrey

1967
Special Report
Summary of reports...1967 sheep and wool day, Corvallis
The effect of pseudo-cryptorchidism upon the feedlot performance and meat quality of lambs, p. 1
B.R. Eller and J.A.B. McArthur

Special Report 241—July 1967
Lamb-feeding practices
D.C. Church, C.W. Fox, T.P. Davidson, W.G. Brown, and J.A.B. McArthur

Circular of Information 625—March 1967
Alfalfa variety tests in the Columbia Basin, Blue Mountains, and Snake River Valley
F.V. Pumphrey, M.M. Oveson, E.N. Hoffman, and L.A. Fitch

1968
Special Report 252—March 1968
Feeding on pasture versus dry lot feeding of early weaned lambs implanted with diethylstilbestrol
B.R. Eller and J.A.B. McArthur

Station Technical Bulletin 103—February 1968
Effects of forest and grazing practices on mixed coniferous forests of northeastern Oregon
D.W. Hedrick, J.A. Young, J.A.B. McArthur, and R.F. Keniston.

Special Report 259—July 1968
Wheat yield and protein content as predictors for nitrogen fertilization in northeast Oregon
F.V. Pumphrey

Director's biennial report 1966–1968—Oregon Agricultural College Experiment Station

1969
Special Report 271—April 1969
Calving difficulty of two-year-old Hereford dams and performance of calves sired by Angus and Hereford bulls
B.R. Eller and J.A.B. McArthur

1970
Special Report 287—March 1970
Management of heavy calves in northeastern Oregon
B.R. Eller and J.A.B. McArthur

Biennial Report 1968–1970—Oregon Agricultural College Experiment Station

1972
Extension Circular 798—January 1972
Forest grazing
Ben Wood

1973
Technical Bulletin 120—February 1973
Estimation of cost functions of northwest beef feedlots from expected marginal revenue observations
J.B. Johnson and Albert N. Halter

Special Report 378—February 1973
Fertilizing rangeland in northeast Oregon
F.V. Pumphrey and R.D. Hart

Special Report 384—May 1973
15th annual beef cattle day report, Union
Immunization for bovine viral respiratory diseases
John A. Schmitz
Acute pulmonary emphysema of cattle
Guy E. Reynolds
Relationship of range forage and cattle management practices to development of acute bovine pulmonary emphysema
Dillard H. Gates
Modern trends in the beef industry
Bart P. Cardon
Range beef cattle management
Robert J. Raleigh
Fall versus spring calving
James A.B. McArthur and Martin Vavra
Early weaning of beef calves
James A.B. McArthur
Short breeding season for cow-calf production in northeastern Oregon
James A.B. McArthur
Management of forested grazing lands in northeastern Oregon
Martin Vavra and James A. B. McArthur
Feeding grass straw to wintering beef cows
Martin Vavra, James A.B. McArthur, and Mark Wing
The performance of steers and induced cryptorchids
Martin Vavra, James A.B. McArthur, and Mark Wing

Special Report 378—February 1973
Fertilizing rangeland in northeast Oregon
F.V. Pumphrey and R.D. Hart

Circular of Information 644—November 1973
"Sick" alfalfa
F.V. Pumphrey and David P. Moore

Special Report 401—December 1973
The performance of lambs weaned at two ages
J.A.B. McArthur and M. Vavra

1974
Special Report 408—March 1974
1974 progress report...beef cattle research, Union
Quality of the diet and intake of steers grazing a forest clear-cut
M. Vavra and R.F. Miller

Special Report 408—March 1974 (cont.)
Summer use by cattle on foothill rangelands in northeastern Oregon
Richard F. Miller and William C. Krueger
Feeding grass straw to wintering beef cows
R.L. Phillips, M. Vavra, and J.A.B. McArthur
The performance of induced cryptorchids and steers
M. Vavra, J.A.B. McArthur, and M.M. Wing

Special Report 410—May 1974
Summary of reports...1974 sheep and wool days, Corvallis
New concept in farm flock sheep production, p. 37
M. Vavra, W.D. Hohenboken, M.M. Wing, and R.L. Phillips

1975
Special Report 431—March 1975
1975 progress report... research in beef cattle nutrition and management
Feeding grass straw to wintering beef cows, p. 5
R.L. Phillips and M. Vavra
Early weaned fall-born calves on irrigated pasture, p. 14
R.L. Phillips and M. Vavra

1976
Special Report 455—March 1976
1976 progress report...research in beef cattle nutrition and management
Weaning management of spring calves on forest ranges, p. 9
M. Vavra, R.L. Phillips, and M.M. Wing
The performance of induced cryptorchids and steers, p. 12
M. Vavra and R.L. Phillips

Special Report 457—May 1976
Summary of reports...1976 sheep and wool days, Corvallis
Performance data from a rotational crossbreeding program, p. 46
Martin Vavra, William Hohenboken, R.L. Phillips, and M.M. Wing

1977
Special Report 477—February 1977
Artificial rearing of lambs
M.M. Wing, R.L. Phillips, and M. Vavra

Special Report 480—March 1977
1977 progress report...research in beef cattle nutrition and management
Feeding alternatives for wintering steer calves, p. 7
M. Vavra and R.L. Phillips
The effects of nutrition level on the performance of wintering cows, p. 13
R.L. Phillips, M. Vavra, and R.J. Raleigh

Special Report 482—April 1977
Summary of reports...1977 sheep and wool day, Corvallis
Breeding ewe lambs: data from the Union Station, p. 17
Martin Vavra, William Hohenboken, Ralph Phillips, and Mark Wing

Station Technical Bulletin 138—May 1977
The effects of age at first lambing on production and longevity of Columbia and Targhee ewes
William Hohenboken, Martin Vavra, Ralph Phillips, and J.A.B. McArthur

1978
Special Report 502—January 1978
Reports on breeding ewe lambs
The influence of age at first lambing on ewe production and longevity
M. Vavra, William Hohenboken, and R.L. Phillips
Ewe lamb fertility as an indicator of future productivity
M. Vavra, J.M. Levine, R.L. Phillips, and William Hohenboken
Factors affecting puberty and reproduction
William Hohenboken, Rose Mary Cedillo, M. Vavra, and R.L. Phillips

Special Report 505—March 1978
1978 progress report...research in beef cattle nutrition and management, Corvallis
Cattle performance on forested and grassland range, p. 7
J.L. Holechek, M. Vavra, J.M. Skovlin, and R.L. Phillips
Winter management of weaner calves, p. 11
R.L. Phillips

1979
Special Report 534—March 1979
1979 progress report...research in beef cattle nutrition and management, EOARC
Cattle performance under three grazing systems in northeastern Oregon, p. 5
J.L. Holechek, M. Vavra, J.M. Skovlin, and R.L. Phillips
The use of growth promotants, p. 14
Ralph L. Phillips

Special Report 549—June 1979
1979 progress report...research in rangeland management
Streambank erosion in a blue mountain stringer meadow in response to livestock and big game grazing management, p. 2
J.C. Buckhouse and J.M. Skovlin
Diets of grazing animals using common range in eastern Oregon, p. 25
M. Vavra and F.A. Sneva
Improved beef production from forested rangelands, p. 29
M. Vavra, J.L. Holechek, and R.L. Phillips

Special Report 560—September 1979
An economic analysis of land prices of mountainous grazing land in eastern Oregon.
John R. Winter and James K. Whittaker

1980
Special Report 582—April 1980
The effect of pre-calving energy level on cow performance
R.L. Phillips and M. Vavra.
Special Report 584—May 1980
The effect of winter-feed levels on steer production
R.L. Phillips, J.L. Holechek, M. Vavra.

Special Report 586—June 1980
1980 progress report... research in rangeland management
The effect of grazing on survival and growth of trees planted in a northeast Oregon clear-cut, p. 28
W.P. Wheeler, W.C. Krueger, and M. Vavra
Plant succession as influenced by habitat type, grazing management, and reseeding on a northeast Oregon clear-cut, p. 32
W.C. Krueger, M. Vavra, and W.P. Wheeler
Cattle grazing potential on clear-cuts, p. 32
M. Vavra, W.C. Krueger, and W.P. Wheeler

Station Bulletin 646—August 1980
Effect of a solid windbreak in a cattle-feeding area
Earl M. Bates and Ralph L. Phillips

1981
Special Report 609—March 1981
1981 progress report...research in beef cattle nutrition and management
Selenium supplementation in selenium-deficient regions, p. 7
K.E. Lanka and M. Vavra
The influence of grazing systems and advance in season on the diet and performance of yearling cattle, p. 14
T.J. Berry and M. Vavra

Special Report 620—June 1981
1981 research in rangeland management
Food habits of deer and cattle grazing in common on a sagebrush-bunchgrass range in northeast Oregon, p. 5
T.O. Hilken and M. Vavra
Interpreting coliform counts in northeast Oregon rangeland streams, p. 15
C. Bohn and J.C. Buckhouse

Special Report 640—September 1981
Hydrologic outputs from woodland, shrubland, and grassland ecosystems in relation to grazing management strategies: an annotated bibliography
Ronald E. Gaither and John C. Buckhouse

1982
Special Report 650—February 1982
Mt. St. Helens ash: considerations of its fallout on rangelands
Forrest A. Sneva, Carlton M. Britton, H.F. Mayland, John Buckhouse, Raymond A. Evans, James A. Young, and Martin Vavra

Circular of Information 691—February 1982
Winter wheat fertilization in the northeast intermountain region of Oregon
F.V. Pumphrey and P.E. Rasmussen

Special Report 653—March 1982
1982 progress report...research in beef cattle nutrition and management
The effects on gain of feeding selenium to cows and calves and injecting selenium in calves, p. 5
K.E. Lanka and M. Vavra
The range beef cattle production system, p. 9
R.J. Raleigh and H.A. Turner

1983
Special Report 678—March 1983
1983 progress report...research in beef cattle nutrition and management
Improved cattle production on forestlands, p. 19
Martin Vavra and Tony Svejcar

Special Report 682—June 1983
1983 progress report...research in rangeland management
Response to coliform bacteria concentration to grazing management, p. 1
J.C. Buckhouse and C.C. Bohn
Home range size and habitat use by wild horses, p. 14
David C. Ganskopp and Martin Vavra
Soil ingestion by ungulates grazing a sagebrush-bunchgrass range in eastern Oregon , p. 35
Forrest A. Sneva, H.F. Mayland, and M. Vavra
Responses of herbaceous vegetation, planted trees, and cattle on a forest plantation, p. 41
W.C. Krueger and M. Vavra

1984
Special Report 714—June 1984
1984 progress report...research in beef cattle nutrition and management
Use of slopes by cattle in rugged terrain, p. 8
David Ganskopp and Martin Vavra

Special Report 715—June 1984
1984 progress report...research in rangeland management
Twentieth-year results from a plantation grazing study, p. 20
William C. Krueger and Martin Vavra

1985

Technical Bulletin 147—March 1985
Ecology and plant communities of the riparian area associated with Catherine Creek in northeastern Oregon
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Range field day progress report 2000—sustainable livestock production in forested and intermountain rangelands
Designing sustainable livestock grazing systems
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Characteristics and challenges of sustainable beef production in the western U.S.
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Effects of season of use on beef cattle distribution patterns and subsequent vegetation use in mountain riparian area
Cory T. Parsons, Patrick A. Momont, Timothy DelCurto, and Jeff L. Sharp
Off-stream water and salt reduce stream bank damage in grazed riparian pastures.
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Influence of a grazing system and aspect, north vs. south, on the nutritional quality of forages, and performance and distribution of cattle grazing forested rangelands

Kenric Walburger, Timothy DelCurto, Martin Vavra, Larry Bryant, and John G. Kie

The influence of season on distribution patterns relative to water and resource use by cattle grazing mixed forested rangelands

Timothy DelCurto, Bruce K. Johnson, Martin Vavra, Alan A. Ager, and Priscilla K. Coe

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Callan Ackerman, Ray P. Ansotegui, Jan P. Bowman, Tim DelCurto, Elaine E. Grings, Pat G. Hatfield, Bret W. Hess, James Ed Huston, Kenneth C. Olson, John A. Paterson, Mark K. Petersen, Larry R. Rittenhouse, David W. Sanson, Connie K. Swenson

Appendix 3b

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Appendix 3c

Eastern Oregon Agricultural Research Center Online

Union Station moves into its second century. Here is a sampling of information available on the World Wide Web regarding research and the staff at the Union Station.

www.orst.edu/dept/eoarcunion
Eastern Oregon Agricultural Research Center Union Station Homepage. Links to information about the station, research, and staff.

www.orst.edu/dept/EOARC
Eastern Oregon Agricultural Research Center Burns Station Homepage.

http://www.agric.gov.ab.ca/crops/forage endophytes_straw.html
Endophytes in Grass Seed Straw, Tim DelCurto. Presented to Alberta Agriculture, Food and Rural Development. 2000 Alberta, Canada.

http://www.agric.gov.ab.ca/crops/forage/ grass_seed_beef.html
Utilizing Grass Seed Residues for Wintering Beef Cattle. Tim DelCurto. Presented to Alberta Agriculture, Food, and Rural Development. 2000 Alberta, Canada.

http://barometer.orst.edu/news/01/01/ns_16_ cattle.html
The Daily Barometer, OSU news and information. "Cattle grazing and riparian zones can coexist, OSU study says"

http://www.columbiana.org/news_jan30_feb5a_ 2001.htm
Columbia River Bioregional Education Project newsletter. "Study: Grazing Strategies Can Ease Riparian Area Impacts."

http://comes.orst.edu/pgs/COMES/organization/ pNp/ffa
Spring/Summer 1998. Oregon's Agricultural Progress Magazine.

http://eesc.orst.edu/agcomwebfile/Magazine/ update.html
Oregon's Agricultural Progress magazine Fall 2000/ Winter 2001, "Scientists Study Grazing Impacts on Land near Stream."

http://www.efw.bpa.gov/Environment/EW/ PROPOSALS/AIWP/2000/2000cd/projects/acrobat/ 20133.pdf
Project proposal to BPA for funding.

http://www.efw.bpa.gov/Environment/EW PROPOSALS/AIWP/1999/9029.pdf
Project proposal to BPA for funding.

http://www.eoni.com/~ambtanaka/
This workshop was presented at the 54th Annual Meeting of the Society for Range Management held in Kona, Hawaii. Presentation by Ann Tanaka, Web Designer, Go Home Networks, Inc., Corvallis, Oregon and Dr. John Tanaka, Eastern Oregon Agricultural Research Center, Union, Oregon.

http://www.eosc.osshe.edu/peers/hrmodels/ spittle.html◆
"On the first day at Hall Ranch this past summer, one group of first grade teachers from Heppner, Oregon became interested in the spittle bugs that seemed to concentrate on the Lupine in the area."

http://www.eou.edu/~schramk/
"After a trip to Hall Ranch by our PEERS group, and listening to Tim DelCurto describe the research done there, our interest in that actual research was sparked. That spark was the inspiration for the Craig L. and Kathleen S. project and led to this the final product."

http://www.eou.edu/~mjaeger/eatlarva.html◆
"In our last PEERS summer workshop we collected beetle larvae from tree stumps at Hall Ranch, Oregon (About 10 miles east of Union in the Wallowa Mountains..."

http://www.faseb.org/asns/graddir/oregon1.html
Information about Oregon State University, Corvallis, Graduate Programs in Animal Nutrition.

http://www.fs.fed.us/news/today/Dec99/dec03.htm
USDA Forest Service. Habitat Restoration Program to be launched in the Blue Mountains. Niles D. Christoffersen.

http://www.fs.fed.us/pnw/bmnri/abstract2.htm
BMNRI research done at the Hall Ranch. Electronic (Fenceless) Control of Livestock in Riparian Areas. Principal Investigators: Art Tiedemann, Thomas Quigley (PNW Research Station).

◆ PEERS, People Exploring Ecosystem Resources as Stewards, is a summer program for teachers through Eastern Oregon University.

http://www.fs.fed.us/pnw/bmnri/pubs/nrn6-4.pdf
BMNRI Natural Resources News, Fall 1996.

http://www.fs.fed.us/pnw/bmnri/research.htm
Blue Mountain Natural Resources Institute (BMNRI) research program.

http://www.fs.fed.us/pnw/starkey/index.html
The Starkey Project Homepage. EOARC is cooperator and provides livestock for the Starkey Project.

http://info.ag.uidaho.edu/AgKnowledge/agknowledge70.htm
"UI-OSU Research Supports Sustainability of Livestock Grazing"

http://www.nmagriculture.org/scientists_find_cattle.htm
"Scientists find cattle, streams compatible—A research team says livestock don't degrade riparian areas if they have other sources of water." By Richard Cockle, Correspondent, The Oregonian.

http://www.oregon-plan.org/supplement12-97/st-14h02.html
Section 3: Narrative Summary of Selected Research and Extension Programs at Oregon State University.

http://oregonstate.edu/dept/ncs/newsarch/2000/Jun00/fieldday.htm
OSU News. OSU range day shares grazing, water quality research.

http://www.orst.edu/dept/animal-sciences/foraglib.htm
Oregon Forage and Byproduct Library, Oregon State University 1998. Ron Hathaway, Diane Carroll, and Tim DelCurto.

http://www.orst.edu/dept/animal-sciences/heifdiet.htm
Incorporation of Grass Straw Nuggets into Dairy Heifer Diets. D.J. Carroll, M. Gamroth, M. Keller, and K.E. Nickell.

http://redtail.eou.edu/peers/newsletters/september96.html◆
How We Spent Our Summer Vacation—"The PEERS SUMMER INSTITUTE 1996 is history. Not long ago, Michael, Donna, Doug, Tim, and Miriam got together and did some reminiscing..." http://www.rmef.org/conservation_section.html?main=/porpp.htm - Rocky Mountain Elk Foundation Oregon Project Partners.

http://www.uky.edu/Agriculture/Agronomy/files/forage/jun99.pdf
Forage News, June 1999. Garry D. Lacefield and Jimmy C. Henning, Extension forage specialists; Christi Forsythe, secretary. "Last month I had the pleasure of traveling with a team from the U.S. to China. We were invited to China to present a workshop on grasses and legumes. Workshop team members were Dr. Don Ball, Extension agronomist, Auburn University, and Dr. Tim DelCurto, Animal scientist."

http://uvalde.tamu.edu/jrm/remote/auesursf.htm
Responses of Elk and Mule Deer to Cattle in Summer. Priscilla K. Coe, Bruce K. Johnson, John W. Kern, Scott L. Findholt, John G. Kie, Michael J. Wisdom. J. Range Manage. 54: A51-A76 March 2001. EOARC is cooperator and provides livestock for the Starkey Project.

http://uvalde.tamu.edu/jrm/remote/stream-paper.htm
Stream change analysis using remote sensing and Geographic Information Systems (GIS). Andrea S. Laliberte, Douglas E. Johnson, Norman R. Harris, and Grant M. Casady. J. Range Manage. 54:A22-A50. March 2001. Research was conducted on EOARC's Hall Ranch.

http://www.visitlagrande.com/sightseeing.htm
THE GRANDE TOUR. A state designated driving tour passes the Union Station—"Oregon State University Agriculture Experiment Station was built in 1901 and was the first in the state to be developed and operated by Oregon Agricultural College. The site was once the farm of Charles Elliott Davis, a prominent Union County agriculturalist and miller who went on to become governor. The building is listed in the State Registry of Historic Buildings. Area research continues at the site. Turn right onto Arch Street than left on 10th to get to the station headquarters."

http://www.asas.org/western/2000abs.pdf
Abstracts American Society of Animal Science Western Section University of California-Davis June 21–23, 2000.

http://www.efw.bpa.gov/Environment/EW/EWP/DOCS/REPORTS/HABITAT/H00000628-1.pdf
Grande Ronde Basin Fish Habitat Enhancement Project *1999 Annual Report.* Vance R. McGowan, Russ M. Powell, and Scott P. Stennfeld. Includes information on the Milk Creek realignment.

◆ PEERS, People Exploring Ecosystem Resources as Stewards, is a summer program for teachers through Eastern Oregon University.

http://jrm.library.arizona.edu/data/1974/276/10krue.pdf
Influence of Cattle and Big Game Grazing on Understory Structure of a Douglas fir-Ponderosa Pine-Kentucky Bluegrass Community. William C. Krueger and A.H. Winward. Research was conducted on EOARC's Hall Ranch.

http://jrm.library.arizona.edu/data/1976/295/3mill.pdf
Cattle Use on Summer Foothill Rangelands in Northeastern Oregon. Richard F. Miller and William C. Krueger. Research was conducted on EOARC's Hall Ranch.

http://jrm.library.arizona.edu/data/1991/444/24will.pdf
Surface runoff plot design for use in watershed research. John D. Williams and John C. Buckhouse. J. Range Manage. 44(4):411-412. Support and funding provided by EOARC Union and Burns.

http://www.orst.edu/dept/range/PDF/Enviromental%20and%20Management%20Impacts%20on%20Stream%20Temperature.pdf
Environmental and Management Impacts on Stream Temperature. William C. Krueger, Tamzine K. Stringham, and Claudia E. Kelley. Final Report 1999. Part of the research was conducted on EOARC's Hall Ranch.