ALASKA CEREAL GRAINS CROP PROFILE

FGV-00041

PRODUCTION FACTS

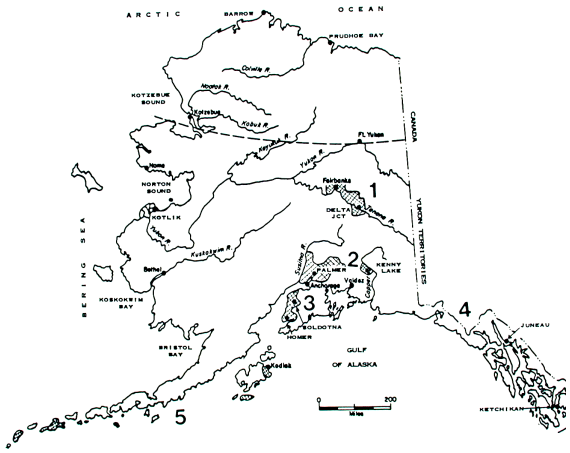
Spring-planted cereal grains (Barley, Oats and Wheat) are best adapted for production in northern latitude areas. Barley (6-row feed grade) is the most common cereal grain produced in Alaska because of its low heat unit requirement for maturity. Multipurpose oats (grain or forage) are the second most popular cereal grains grown. Winter wheat crops have not proven successful due to their long growing season requirements. This makes winter wheat prone to winterkill and snow mold losses. Profitable yields of quality cereal grains require considerable cropping experience, biological knowledge and exceptional managerial skills. Growing conditions in the sub-arctic of Alaska present unique challenges. Long-day photoperiods (20+ hours of daylight in June) and a frost-free growing season of 100-118 days in length characterize the growing season. This is offset by low spring precipitation (1.0-1.1 inches for April and May combined), cool summer temperatures (average July temperatures of 58°F and 61°F for South Central and Interior regions of Alaska, respectively), cool-damp autumns (average temperature in September of 44°F and 47°F with 1.0 and 2.4 inches of precipitation as rain and snow for the Interior and South Central regions, respectively), and cold winter temperatures (average January temperatures of –2°F for the Interior and +14°F for the South Central areas). The average yield of barley for the 1993-2000 period was 34.3 bu/ac with a range of 19-51 bu/ac. Oat yields for the same period ranged from 28-60 bu/ac with an average yield of 41.6 bu/ac. The Alaska barley crop has averaged 199,213 bushels per year from an average of 5,775 acres for the period of 1993 – 2000. Oat production from the same 8-year period has averaged 46,888 bushels from 1,100 acres. Alaskan barley and oat crops have an 8-year average production value of $669,625 and $118,375 respectively (Benz and Roos, 2001). In 2000 barley sold for $3.36 per bushel in Alaska while the price averaged $2.13 in the rest of the country. Alaskan produced oats sold for $2.52 per bushel in 2000 compared to $1.43 in other states. Few cereal grains are ever exported from Alaska.

US RANKING[1] (2000): 27th of 28 in barley production value ($369,000)
US RANKING (2000): 25th of 28 in barley acres harvested (3,300)
US RANKING (2000): 28th of 28 in oat production value ($ 22,000)
US RANKING (2000): 28th of 28 in oat acres harvested (300)
PRODUCTION AND STORAGE COSTS: $109-151/ac (estimated)[2]

[1] US Ranking: Benz, 2002.

[2] Production costs are estimated from "Doane's Agricultural Reports – 1999 Machinery Custom Rate Guide" and "Crop Production Costs" from Grainews of Winnipeg, Manitoba (2/16/2000).

PRODUCTION REGIONS



Cereal grains are produced in many areas of Alaska. The majority of the cereals however, are produced in two regions: the Matanuska-Susitna Valley of South Central Alaska (2) (61N 149W) and the Tanana Valley of Interior Alaska (1) (63N 145W). The South Central region is near sea level in elevation and influenced by a maritime climate. The Interior region is 400-1300 feet in elevation with a continental climate regime. The maritime climate generates more precipitation, a longer frost-free growing season, but cooler and wetter growing conditions than occur in the Interior of Alaska. High winds that can scour insulating snow from the fields occur in parts of the Interior and South Central regions.

All-weather roads permit cereal grain products to be marketed interchangeably among the more developed regions of Alaska. The South Central and Kenai Peninsula regions contain some commercial dairies, beef, sheep and goat producers along with a large number of recreational livestock (horse, llama, alpaca, etc.) owners. The cereal grain market in the Interior is comprised of more commercial dairies, beef and hog production units and game ranches with less emphasis on the recreational livestock market.

Region	% Acreage[3]		% Production[3]		% Value[3]	
	Barley	***Oats***	***Barley***	***Oats***	***Barley***	***Oats***
Interior	96	72	97	29	97	27
South Central	4	28	3	71	3	73

CROPPING PRACTICES

Soils and Fertility: Commercial cereal grain producers utilize periodic soil analyses with University fertilizer guides to determine crop nutritional requirements and annual supplemental fertilizer application rates. Supplemental fertilization rates vary with the cropping practices of the producer and the region in which the grain crop is being produced (Gavlak and Johnson, 1992). About 31% of the barley and 58% of the oat crops are raised on ground that has been fallowed the previous year. The remainder of the grain is grown on a continuous cropping rotation. The Federal Conservation Reserve Program has removed over 25% of the grain acreage from production. Residue management also influences the amount of supplemental fertilization. Much of the grain straw is harvested and removed from the fields. Incorporating straw into the soil prior to seeding another crop requires additional nitrogen fertilization (25 lbs/ac per ton of residue) to offset the nitrogen tie-up during straw residue decomposition. Grain producers targeting yields of 1 ton or more per acre typically apply 40-85 lbs/ac of nitrogen, 40-60 lbs/ac of phosphate,

[3] %Acreage, % Production, % Value (Benz and Roos, 2000)

and 20-45 lbs/ac of potash in South Central Alaska. Interior producers usually apply 60-85 lbs/ac of nitrogen, 40 lbs/ac phosphate, 20 lbs/ac potash and 10 lbs/ac of sulfur. All fertilizers are applied at the time of planting in the spring. Most producers apply all of the phosphate in a band near the seed to increase fertilizer use efficiency, stimulate root growth and hasten crop maturity (Mitchell, 1994).

Seeding and Varieties: 'Otal' and 'Datal' are two of the most common varieties of barley (*Hordeum vulgare*) raised in Alaska (Dofing, 1993). These early-maturing feed-barleys were developed at the University of Alaska Agriculture and Forestry Experiment Station in the early 1980's along with 'Thual' and 'Weal' barleys. 'Thual' is a hulless variety that has nutritional values similar to wheat and 'Weal' is an awnless, dual-purpose (grain and forage) variety. Very few acres of either 'Thual' or 'Weal' are raised. 'Ingal' and 'Nogal' are wheat varieties developed in this time frame by the University and grown in limited "niche" market situations. The University is continuing to evaluate some varieties developed in other northern latitude regions for adaptation to Alaskan growing conditions. 'Toral' is a variety of oats (*Avena sativa*) also developed at the University. This is a dual-purpose oat but has not met with much grower acceptance because seed is difficult to raise and obtain. The majority of oat seed is imported from the Peace River region of Alberta, Canada. Alaskan producers do utilize much of their own barley for seed. A few producers raise commercial seed and some seed is purchased in Alberta Canada or from other northern latitude production areas. Seeding rates vary from 70-100 pounds of pure live seed per acre. Use of certified seed is encouraged. When using uncertified, bin-run seed, producers select clean, plump kernels with heavy test weights from disease free fields and also test for germination. Seeding is accomplished mainly with grain drills of which most will have fertilizer attachments and press wheels. A 6-7 inch row spacing of the seed is utilized, planted at depths of 0.5- 1.5 inches. Due to the low rainfall at and directly after planting, growers use various techniques to conserve soil moisture. This includes minimizing the number of tillage operations, and packing the seedbed to firm the seed into the soil moisture (Quarberg, 1986). No-till seeding is being evaluated. One major problem of no-till seeding is the invasion of perennial grasses, which severely compete with the cereal crop for nutrients, sunlight and physical space.

Irrigation: Interest in irrigation of cereal crops is increasing, especially in the Interior region where less than 1% of the crop receives supplemental water. Producers are experimenting with irrigation to evaluate the costs and benefits on cereal grain production. Center pivots, wheel and hand lines are being examined. Tensiometers, experience and capacities of the irrigation systems determine irrigation schedules.

IPM PRACTICES

Cereal grain producers employ several IPM practices in combating the various local weeds, diseases, insects and "other" pests. Producers participate in University and Department of Environmental Conservation training programs on pesticide handling, application, storage and disposal.

Diseases: Barley and oat diseases have not previously been significant problems in Alaska. As a result, the varieties of cereals developed in Alaska have low resistances to these diseases (Dofing, 1993). Scald (*Rhynchospoium secalis*), Stripe (*Pyrenophora graminea*), Net Blotch (*Pyrenophora teres*), Spot Blotch (*Cochliobolus sativus*), and smuts (*Ustilago spp.*) are all infecting cereal grains in Alaska. Growers lessen the incidence of the diseases by rotating crops and selecting seed from fields with minimal disease infestations. We are currently seeking a state registration for Carboxin (Vitavax - 34) as a barley and oat seed treatment. Bergman (1999) reported after field visits to the Delta Junction area, that diseases were becoming quite prevalent. Barley stripe was severe in some fields, as was scald, plus net and spot blotches. As mentioned previously, the Federal Conservation Reserve Program has somewhat restricted the amount of cropland available for crop rotation. In addition, no alternative crop has been developed that can be economically rotated with the cereal grains other than forage and a limited acreage of potatoes.

Insects: Occasionally an outbreak of grasshoppers occurs. The migratory (*Melanoplus sanguinipae*) and band-winged (*Camnula pellucida*) grasshoppers are the two most common. Insecticides have not been necessary to control these insects since 1992 when late spring and early autumn snows interrupted their life cycles, causing drastic declines in their populations. Field scouting and late fall or early spring tillage of grasshopper egg beds is occasionally used to help control their numbers. A parasitic fungus (*Entomophaga praxibuli*) was experimentally released in the Delta Junction area in the early 1990's. The fungus has been observed on deceased grasshoppers for several years. Evaluation of this fungus is continuing.

Weeds: Cereal grains can experience severe competition from uncontrolled weeds. Fields are often fallowed to control weeds, interrupt disease cycles and conserve soil moisture. In this effort, growers are employing more chemical fallow for improved weed control, less soil erosion, conservation of soil moisture, fuel, equipment use and labor. The more problematic common weeds are lambsquarter (*Chenopodium album*), shepherd's purse (*Capsella bursa-pastoris*), chickweed (*Stellaria media*), hawksbeard (*Crepis tectorum*), wild buckwheat (*Polygonum convolvulus*), corn spurry (*Spergula arvensis*) and bluejoint reed grass (*Calamogrostis canadensis*). A few noxious weeds are becoming established including wild oats (*Avena fatua*), hempnettle (*Galeopsis tetrahit*), quackgrass (*Agropyron repens*), and perennial sowthistle (*Sonchus arvensis*). Because of the limited amount of spring precipitation, it is extremely important to conserve soil moisture to permit early germination of the crop. This enables a more competitive crop and also allows rapid crop development to the desired growth stage for effective herbicide utilization. Field scouting is used to identify the types of weeds, their economic thresholds, stage of growth of both weeds and crops and then selection of the most desirable herbicide control program. We are currently seeking Alaska registration for alternative Dicamba products, Metsulfuron-methyl (Ally) and Thifensulfuron

methyl/Tribenuron methyl/Metsulfuron methyl (Ally Extra) for dealing with difficult weed problems in cropping and/or fallow situations.

Herbicides

Barley

Herbicide	Use (Acres)	Users	Rate/Acre (Product)	Rate/Acre (A.I.)
2,4-D	78%	75%	0.5-3 pts.*	0.23-1.4 lb.
Dicamba (Clarity)	11%	25%	2-8 oz.	0.0625-0.25 lb.
Glyphosate	16%	60%	1 pt.-5 qts.	0.5-5 lb.

*Rates above 2 pts. per acre may cause damage to barley crop.

Oats

Herbicide	Use (Acres)	Users	Rate/Acre (Product)	Rate/Acre (a.i.)
Dicamba (Clarity)	84%	67%	2-4 oz.	0.0625-0.125 lb.
Glyphosate	27%	50%	1 pt.-5 qts.	0.5-5 lb.
MCPA	95%	90%	0.5-2 pts.**	0.23-0.925 lb.

**Rates above 0.5 pts. per acre may cause grain injury.

Other Pests: Migratory waterfowl (geese, ducks and cranes) feed heavily on swathed grain. Noisemakers and other forms of hazing have very limited effect until hunting season opens. A wild free-ranging herd of approximately 500 bison present a more formidable pest problem in Interior Alaska. Bison feed and trample the cereal grains. Noisemakers and physical hazing have limited effects or simply move the problem to adjacent fields or farms. If hazing is sufficient to prevent the bison from feeding during the day they feed in the fields at night. Bison droppings also contain weed seeds, which serve as a contaminant and source of weed invasions. Moose often feed on the developing cereal grains. They are fewer in number and more delicate feeders than the bison. An even more physically hazardous pest that consumes cereal grains is the grizzly bear. They seem to prefer grain in the milk and dough stages of development. Up to seven bears have been reported foraging on a single oat field at dusk. Their damage to the cereal grain is insignificant compared to the bison and waterfowl.

HARVEST

Harvest of barley begins in mid to late August and continues through mid to late September. Most growers will begin swathing the grain as soon as it is physiologically mature. Swathing continues until the moisture content of the grain is down to 18-20% at which time they begin straight cutting (threshing). Grain is dried to 13-14% moisture before storage. Swathing is done, especially on uneven maturing stands of grain, to reduce the drying required for safe grain storage. If weather conditions deteriorate, swathing will be done to prevent severe grain shattering and lodging from snow. Combining continues following melt-off of the snow from the swaths of grain. Permanent snow cover is not normally present until early October.

STORAGE

Most grain is stored at approximately 13-14% moisture. In this condition the grain will store indefinitely. Insect problems have not been a problem in grain stored properly in metal bins. Alaska's cold winter temperatures inhibit insect populations in the grain. If grain is stored too damp (> 14% moisture) it has a tendency to heat and then mold. Proper drying prevents this. The average Alaskan cereal grain crop is dried approximately 5 – 7 points before storage. A limited amount of cereal grain is harvested as high moisture grain for livestock feed. This grain is stored at 25-30% moisture in oxygen-limiting plastic bags. Moisture content is fairly critical, grain with excessive moisture tends to freeze in the winter and spoil in the warmer seasons. If the grain is too dry it fails to properly ensile and is more prone to spoilage. Proper location and protection of the storage bags is critical. Rodents, ravens, moose and bear (black and grizzly) have all destroyed silage bags in Alaska.

GRADING and MARKETING

The Alaska Division of Agriculture occasionally samples Alaskan grain and grades it according to the National Standards for cereal grains. In general however, all Alaskan produced grain is marketed and consumed in state. The price of the grain is negotiated between the buyer and the seller with test weight being the tool for quality evaluation. All producers market their own cereal grain products. Grain is sold whole, rolled, ground and pelleted.

SUMMARY

Cereal grain production is a very important component of the Alaskan Agricultural Industry. Cereal feed grains are utilized by the Alaskan dairy industry, swine producers, beef producers, sheep and goat owners, and the recreational livestock owners as well as those families raising limited numbers of animals for their own consumption (subsistence).

Consistently raising quality feed grains is and will remain an economic challenge in Alaska. The unique climatic and pest conditions, coupled with the current economic condition (attitude) of the state limit the development and adaptation of new technologies for agriculture. With the current limitation on University research and extension, as well as market development through the Division of Agriculture, producers must essentially attempt to adopt the needed technology themselves. This can be a slow and painful process. However, Alaskan cereal grain producers continue the quest to improve production economics and marketing efficiencies while also striving to protect the environmental quality of Alaska.

Donald M. Quarberg: Professor of Extension – Emeritus
Original Author

Thomas R. Jahns: Alaska Pest Management Program Coordinator and Land Resources District Agent
Original Editor University of Alaska Fairbanks - Cooperative Extension Service
Revision Author

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