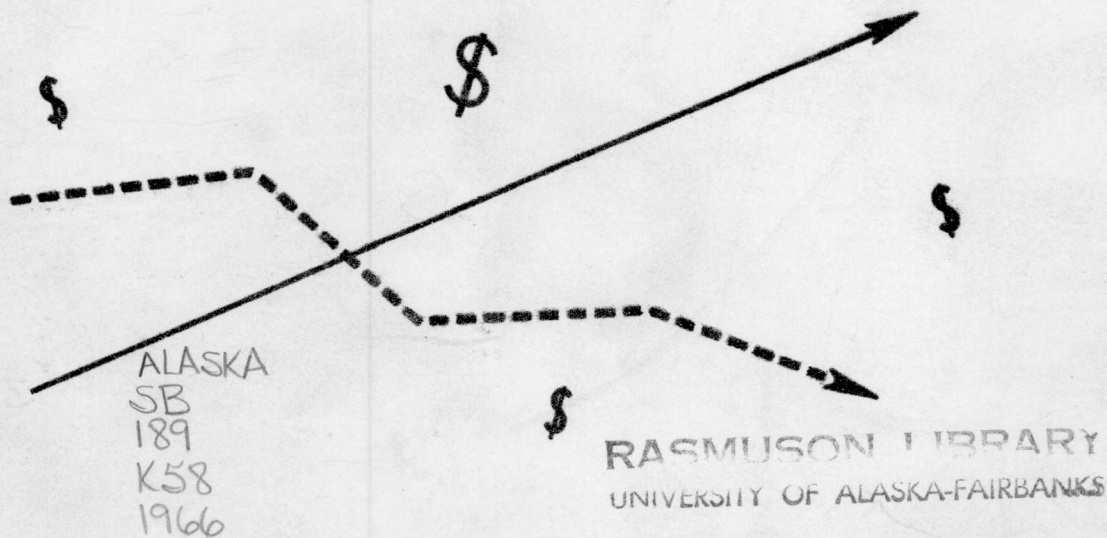




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PLANTING RATE OF **OATS & PEAS:** SOME YIELD, QUALITY, AND COST CONSIDERATIONS



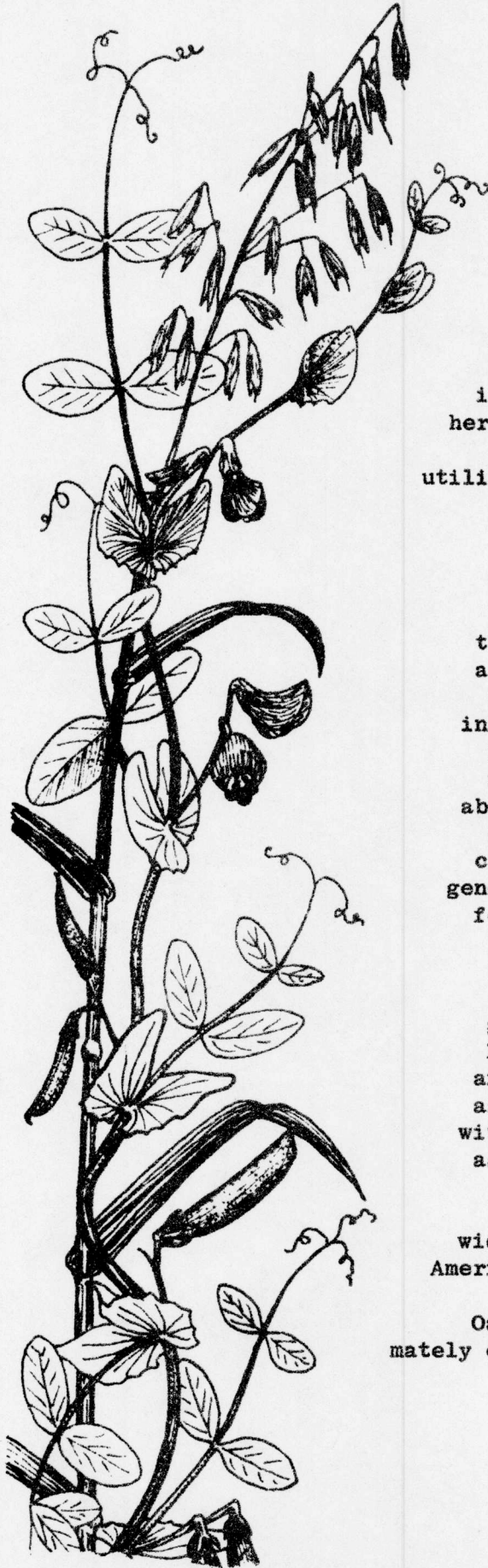
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PLANTING RATE OF OATS AND PEAS:
SOME YIELD, QUALITY, AND
COST CONSIDERATIONS

BACKGROUND

Crop plants used to feed livestock are, for the most part, grasses and legumes. Taken broadly, grasses include the many native and cultivated herbage grasses used as forages, as well as the cereal grasses that are either utilized for forage or harvested for grain.

Leguminous crops are valued as forages because they are generally higher in protein and certain nutritionally important mineral elements than grasses. Leguminous forage crops are prized for their unique ability to capture atmospheric nitrogen from air in the soil and incorporate it into the plant tissues. This property, called nitrogen fixation, accounts for valuable savings in the requirement of purchased fertilizer nitrogen for forage crops. It also is responsible for the generally high protein content of legume forages.

Biennial and perennial legumes, such as the clovers and alfalfa, are generally unsuited for use in Alaska. Field peas, on the other hand, are an annual legume and well adapted for use as a forage crop in Alaska, especially with an annual grass or grain crop such as oats.

Oat-pea mixtures are the most widely used annual forage crop in North America in areas where the growing season is too cool for good growth of corn. Oat-pea mixtures are grown on approximately one third of Alaska's cropland acres.

Livestock feeding programs for Alaska dairy farms are formulated to provide well balanced, nutritious rations supplying all necessary dietary requirements for each of the various classes of livestock fed. Each dairyman formulates his own specific feeding program for the milking herd. Rations for dairy animals must sustain animal health, promote maximum production and be economically sound. Crop rotations are planned so that yields will maintain adequate, year-round supplies of the major feed crops -- grain and roughage.

The roughage portion of the dairy ration includes hay, silage, green-chop forage and grazed pastures. Roughage is the least costly, per unit weight or volume, of all the feedstuffs supplied to dairy animals. However, because of the large amounts consumed by dairy cattle, both per-acre yields and quality of roughage crops are very important considerations. Roughage is available during the growing season as grazed pastures or green-chop forage. However, the relatively brief growing season in Alaska places special emphasis on producing roughages for storage as hay, silage, haylage or other forms. The supply of stored forage must be adequate to feed the herd during the long winter period and until new growth of forages becomes available in spring.

Many classes of roughage are relatively limited in the range of crude protein content they possess at harvest. That is, if the forage is harvested at a stage of growth that is considered to provide optimum balance of yield and quality, and recommended rates of fertilizer have been applied, the crude protein content of the roughage will be within fairly narrow limits. Exceptions to this are oat-pea mixtures. These are subject to a considerable range in crude protein content of the crop harvested. This range in protein content is influenced by the seed mixture that is planted. Therefore this crop can be manipulated to provide a relatively high or low protein roughage as desired.

An oat-pea crop is usually harvested when the oats are in the late milk to early dough stage of development. At this time the oat plants contain only 5% to 10% crude protein while pea plants may contain near 20%. Therefore, the relative amounts of oats and peas in the crop harvested, as influenced by the seed mixture planted, will determine the crude protein content of the crop.

EXPERIMENTAL STUDY

In order to compare the yields, costs, and returns that farmers may expect from planting oats with various quantities of peas, replicated tests were planted at the Matanuska Farm on June 8, 1963 and May 28, 1964. Four different seed mixtures were planted involving different ratios of oats to peas. All four combinations totalled 100 pounds of seed per acre. An 8-32-16 fertilizer was applied at planting at 400 pounds per acre.

Plots were harvested on September 16, 1963 and September 8, 1964 when oats were in the early dough stage and pea plants had pods filled about half way up the stem.

Planting rates that contained progressively higher percentages of peas showed a definite tendency toward heavier yields of the green crop as cut. Differences were not statistically significant in either of the two individual tests (Table 1) but were significant with the two-year averages. The trend toward heavier yields with the higher rates of peas was offset by a greater moisture content (less dry matter) in mixtures with the higher rates of peas. Therefore, dry-matter yields were essentially equal from all rates of sowing (Table 1).

TABLE 1. Yield of forage as influenced by amount of oats and peas planted.

Sowing rate (lbs/acre)	Yield as cut			Dry matter content as cut			Dry matter yield		
	1963	1964	Avg.	1963	1964	Avg.	1963	1964	Avg.
Oats-Peas	Tons/acre			Percent			Tons/acre		
100 - 0	10.89	11.90	11.40	30.4	38.1	34.3	3.31	4.54	3.93
80 - 20	12.62	12.86	12.74	25.9	33.0	29.5	3.27	4.24	3.76
60 - 40	14.44	14.65	14.55	23.7	28.4	26.1	3.42	4.16	3.79
40 - 60	15.82	16.42	16.12	21.6	24.3	23.0	3.42	3.99	3.71
L.S.D. 5%	N.S.	N.S.	1.74	1.7	4.0	2.1	N.S.	N.S.	N.S.

Yields from the different sowing rates, however, differed significantly in protein content of the forage and in total yields of protein produced (Table 2). Protein content and protein yields of the forage with 40 pounds of oats and 60 pounds of peas per acre were double those from oats alone at 100 pounds per acre.

TABLE 2. Crude protein content of forage and protein yield per acre as influenced by amount of oats and peas planted.

Sowing rate (lbs/acre)	Protein content (dry-matter basis)			Protein yield in forage		
	1963	1964	Avg.	1963	1964	Avg.
Oats-Peas	Percent			Lbs/acre		
100 - 0	6.5	5.6	6.1	431	508	470
80 - 20	9.0	8.0	8.5	588	679	634
60 - 40	11.1	10.4	10.8	760	865	813
40 - 60	12.8	12.3	12.6	875	982	929
L.S.D. 5%	1.4	1.5	1.2	153	74	88

Pea seed is more expensive than oats. Moreover, all pea seed used in Alaska has been imported. Therefore, planting of peas necessitates an out-of-pocket expenditure while seed oats may be grown by the farmer himself. Accordingly, the contribution of peas to the forage produced must be evaluated critically to determine the extent to which they should be included with oats for forage. Table 3 presents seed costs and protein returns for the studies reported here.

TABLE 3. Seed cost and value of protein produced as influenced by quantity of peas planted.

Sowing rate (lbs/acre)	Seed cost per acre		Increased seed cost per acre over oats alone	Increased protein yield over oats alone			Value of increased protein yield per acre (over yield from oats alone)*		
	Oats@ \$7/cwt	Peas @ \$11/cwt		1963	1964	Avg.	1963	1964	Avg.
Oats-Peas				Lbs/acre					
100 - 0	\$7.00	-	-	-	-	-	-	-	-
80 - 20	5.60	\$2.20	\$.80	157	171	164	\$23.55	\$25.65	\$24.60
60 - 40	4.20	4.40	1.60	329	357	343	49.35	53.55	51.45
40 - 60	2.80	6.60	2.40	444	474	459	66.60	71.10	68.85

* For comparative purposes in this table, protein was valued at 15¢ per pound. Current typical costs to Alaskan farmers of purchased protein in various concentrates include:

Cottonseed meal (imported) . . .	44%	18¢/lb
Linseed oil meal (imported). . .	42%	21¢/lb
Soybean oil meal (imported). . .	50%	18¢/lb
Meat meal (local).	40-50%	12-15¢/lb
Dairy concentrate.	40%	20¢/lb

In order to provide the protein required by the dairy herd, protein not raised on the farm must be purchased. Purchased protein, as shown in the above listing, is expensive. By including the optimum quantity of peas in oat-pea mixtures, home grown oat-pea silage can contribute substantially more of this costly feed constituent than is provided by equal acreage planted to oats alone or to an oat-pea mixture with too few peas.

If other sources of protein in the dairy ration indicate that a relatively low-protein roughage is required, oats may be grown alone. On the other hand, if a higher protein roughage is required, peas should be included with oats to whatever extent is necessary to produce a crop containing the desired protein level.

To prevent excessive lodging of the crop, at least 40 to 50 pounds of oats and no more than 60 to 70 pounds of peas should be planted per acre. Moreover, as indicated in Table 1, a large proportion of peas in the mixture results in a crop containing more moisture (lower dry-matter content) than oats alone. This may require wilting after cutting to bring the crop to the desired moisture content before ensiling.

ACKNOWLEDGMENT

Contributions to this study by Mr. Darel Smith, agronomy aid, and Mrs. Margaret Blom, chemist, are gratefully acknowledged.

ADDITIONAL INFORMATION

Other sources of information on the use of oat-pea forage in Alaska include:

Hodgson, H. J. 1956. Effects of Seeding Rates and Time of Harvest on Yield and Quality of Oat-Pea Forage. *Agronomy Journal* 48:87-90.

Sweetman, W. J., and A. L. Brundage. 1960. Better Forage for Alaska's Dairy Industry. *Alaska Agr. Exp. Station Bull.* 30...19 p.

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