

# Lambs & Fieldpeas- 1998 Sheep Day Report

## Field Pea as a feedstuff for growing lambs.

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### Introduction

Grain producers are beginning to recognize the advantages of adding field pea (*Pisum sativum*) into their small grain rotations (Endres, 1996). Field pea, while yielding similarly to wheat, has been shown to improve long-term soil quality, increase soil nitrogen content, and provide a break in the cycle of many organisms that can cause problems in wheat production (e.g. orange wheat blossom midge, scab). In part due to these agronomic benefits, acreage seeded to field pea has steadily increased in North Dakota. As the production of field pea increases in the state, producers are looking for alternative markets for their grain.

The chemical composition of field pea (Table 1) suggests that it has an excellent potential to be used as a livestock feed. A brief summary of Canadian research (Hickling, 1994) indicates that field pea can be used as a major source of supplemental protein for dairy cattle. Poland and Landblom (1996) concluded that field pea is a suitable substitute for barley and soybean oil meal when replacement is made on an equivalent protein basis in growing calf diets. Thus, a lamb feeding trial was designed to evaluate the feeding potential of field pea in growing lamb diets. The study involved substituting all or a portion of the barley and soybean oil meal in a control diet with graded levels of field pea.

### Materials and Methods

Two-hundred-forty lambs (wethers and ewes) were used to investigate the feeding potential of field pea in the diets of growing lambs. Lambs ( $72.3 \pm 10.0$  lbs initial body weight) were allotted by weight and sex into 8 finishing pens on April 16, 1997. Four dietary treatments were then assigned to pens (2 pens/treatment). A 81% concentrate, self-fed control diet (0%Pea) containing barley, soybean oil meal, alfalfa hay, straw and vitamin and mineral supplements was established (Table 2). Ammonium chloride was also included to prevent urinary calculi (NRC, 1985). The control diet was formulated to meet or exceed the nutritional needs of an early-weaned lamb possessing a moderate to rapid growth potential (NRC, 1985). Three other diets (Table 2) were constructed where field pea replaced one-third (33%Pea), two-thirds (66%Pea) or all (100%Pea) of the soybean oil meal in the control diet. A proportional amount of barley was also displaced by field pea so that diets would be isonitrogenous. Lambs were fed for 90 days. Live weights were recorded at the beginning and conclusion of the study.

Nine lambs died during the course of the trial. Death loss is reported as the average number of lambs per pen within a treatment that died expressed as a percentage of the total of number of lambs in that pen. Calculations of death loss and lamb feeding days (total number of days individual lambs were fed) are

based upon all lambs starting the trial. Subsequently, data from those lambs that died was deleted from the data set before performing further statistical analyses. Data were analyzed as a split-plot design, where the whole plot was treated as a completely random design. Dietary treatment was the only whole plot factor and pen of lambs represented the experimental unit. Lamb sex was considered the split-plot factor. The sex of 15 lambs was not recorded in the original data set. These lambs were coded with a separate sex code. Means for lambs of unknown sex are not reported since proportion of wethers and ewes in this sex class within a pen was unknown. No interactions were present between sex (wether or ewe) and level of field pea in the diet.

## Results

Feedlot performance is summarized in table 3 and 4. There were no differences due the inclusion of field pea (Table 3) on the percentage of lambs that died during the course of the trial (average = 3.75%) or on the total number of lamb feeding days (average = 88.3 days per lamb). Feeding field pea in a high concentrate diet did not statistically improve final live weight ( $P = .88$ ), total gain ( $P = .68$ ), average daily gain ( $P = .68$ ) or average daily feed intake ( $P = .54$ ). Feed efficiency ( $P = .78$ ) was also not affected by the feeding of field pea.

Wether lambs (Table 4) were heavier than female lambs at the beginning ( $P < .001$ ) and the end ( $P < .001$ ) of the trial. Total weight gain ( $P < .02$ ) and average daily gain ( $P < .02$ ) also favored wether lambs. Feed efficiency ( $P < .05$ ) was improved in wether, over ewe, lambs. However since daily feed intake was assumed to be the same for all lambs in a pen (sexes combined), this difference in feed efficiency is computationally a difference in average daily gain.

## Discussion

The results of this study are similar to those previously reported (Poland and Landblom, 1996), where field pea was fed in barley-based, high concentrate (70%) diets to growing calves. In that experiment, average daily gain and feed efficiency were not affected by feeding field pea. However in a second experiment (Poland and Landblom, 1996), calf performance and feed efficiency were improved by the inclusion of field pea into a lower concentrate (30%) diet. Research in South Dakota (C. Birkelo, SDSU; personal communication) included field pea in a corn-based, high concentrate (90%) finishing diet for cattle. While average daily gain was not affected, feed efficiency was improved (5.1 vs 4.8 feed/gain) when field pea replaced corn and soybean oil meal.

## Conclusion

Field pea appears to be an excellent substitute for barley and soybean oil meal for growing lambs and calves. More research is needed to completely characterize the nutritional benefits of using field pea as feedstuff for all types of sheep and cattle.

## References

Endres, G. 1996. Field pea can pay in a wheat rotation. NDSU Extension news release. Carrington Research Extension Center. November 7<sup>th</sup>.

Hickling, D. 1994. Canadian peas: Feed industry guide. Canadian Special Crops Association (Winnipeg, MB) and Western Canadian Pulse Growers Association (Regina, SK).

NRC. 1985. Nutrient Requirements of Sheep. National Academy Press, Washington, DC.

Poland, W.W. and D.G. Landblom. 1996. Feeding value of field pea and hull-less oat in growing calf diets. ND Cow/calf conference and beef cattle and range research report, North Dakota State University, pp3-11.

Table 1. Chemical composition of field pea<sup>a</sup> (Hickling, 1994).

| Item                          | Average |
|-------------------------------|---------|
| Crude protein                 | 26.0    |
| Ether extract (fat)           | 1.4     |
| Acid detergent fiber (ADF)    | 9.1     |
| Neutral detergent fiber (NDF) | 19.8    |
| Starch                        | 60.0    |
| Ash                           | 3.7     |

<sup>a</sup> Composition expressed on a dry matter basis.

Table 2. Diet composition and nutrient analysis of growing lamb diets containing field pea.

|                  | Level of Field Pea |      |      |      |
|------------------|--------------------|------|------|------|
|                  | 0%                 | 33%  | 66%  | 100% |
| Feedstuffs:      |                    |      |      |      |
| Barley           | 72.6               | 66.6 | 60.5 | 54.5 |
| Soybean oil meal | 8.4                | 5.6  | 2.8  | 0.0  |
| Pea              | 0.0                | 8.8  | 17.7 | 26.5 |
| Alfalfa hay      | 11.8               | 11.8 | 11.8 | 11.8 |
| Straw            | 4.4                | 4.4  | 4.4  | 4.4  |
| Limestone        | 1.8                | 1.8  | 1.8  | 1.8  |

|                                    |      |      |      |      |
|------------------------------------|------|------|------|------|
| TM salt                            | 0.5  | 0.5  | 0.5  | 0.5  |
| Ammonium chloride                  | 0.5  | 0.5  | 0.5  | 0.5  |
| Vitamin supplement                 | 0.05 | 0.05 | 0.05 | 0.05 |
| Formulated analysis <sup>a</sup> : |      |      |      |      |
| DM, %                              | 88.8 |      |      |      |
| TDN, %DM                           | 78.0 |      |      |      |
| ME, Mcal/lb DM                     | 1.28 |      |      |      |
| CP, %DM                            | 16.0 |      |      |      |
| Ca, %DM                            | .91  |      |      |      |
| P, %DM                             | .36  |      |      |      |

<sup>a</sup> Analysis was calculated using book values for individual feed ingredients.

Table 3. Effects of feeding field pea on feedlot performance of growing lambs.

| Item                                   | Level of Field Pea |        |        |        | SE     |
|----------------------------------------|--------------------|--------|--------|--------|--------|
|                                        | 0%                 | 33%    | 66%    | 100%   |        |
| Number <sup>a</sup> , per pen          |                    |        |        |        |        |
| Initial                                | 30                 | 30     | 30     | 30     | --     |
| Dead                                   | 8.3                | 3.3    | 0.0    | 3.3    | --     |
| Animal days                            | 2601.5             | 2649.5 | 2700.0 | 2644.0 | 49.98  |
| Weights <sup>b</sup> , lb/hd           |                    |        |        |        |        |
| Initial                                | 75.3               | 71.0   | 72.1   | 72.0   | 0.93   |
| Final                                  | 104.7              | 107.3  | 109.7  | 111.3  | 6.51   |
| Total gain                             | 29.4               | 36.2   | 37.6   | 39.2   | 6.57   |
| Daily gain <sup>b</sup> , lb/hd        | 0.33               | 0.40   | 0.42   | 0.44   | 0.067  |
| Daily feed intake <sup>b</sup> , lb/hd | 3.57               | 3.72   | 3.70   | 3.66   | 0.048  |
| Efficiency <sup>b</sup> :              |                    |        |        |        |        |
| Gain/feed                              | 0.092              | 0.109  | 0.113  | 0.119  | 0.0150 |
| Feed/gain                              | 10.9               | 9.2    | 8.8    | 8.4    | --     |

<sup>a</sup> These data are from lambs that started the trial.

<sup>b</sup> These data are for lambs that finished the trial.

Table 4. Effects of lamb sex on feedlot performance of growing lambs.

| Item                         | Males | Females | SE |
|------------------------------|-------|---------|----|
| Weights <sup>a</sup> , lb/hd |       |         |    |

|                                         |       |       |       |
|-----------------------------------------|-------|-------|-------|
| Initial <sup>b</sup>                    | 75.3  | 69.9  | 0.96  |
| Final <sup>b</sup>                      | 115.2 | 105.4 | 1.83  |
| Total gain <sup>c</sup>                 | 39.9  | 35.5  | 1.30  |
| Daily gain <sup>ac</sup> , lb/hd        | 0.44  | 0.39  | 0.014 |
| Daily feed intake <sup>cd</sup> , lb/hd | 3.66  | 3.66  | -.-   |
| Efficiency <sup>a</sup> :               |       |       |       |
| Gain/feed <sup>c</sup>                  | 0.121 | 0.108 | .0039 |
| Feed/gain                               | 8.25  | 9.28  | -.-   |

<sup>a</sup> These data are for lambs that finished the trial.

<sup>b,c</sup> Sexes differ ( $P < .01$  and  $.05$ , respectively).

<sup>d</sup> Daily feed intake was assumed equal for all lambs in a pen.

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