1990 RESEARCH PROJECT

Existing livestock systems in Cumberland Co. rely mainly on grass, clover and spring cereals for home grown forage and grain. There are well known limitations to these systems on the fragi-pan or basil-till soils which predominate in the county and which often suffer from early season wetness and mid-summer drought. Together with the high costs of fertilizers or purchased feed in comparison to farm gate prices, these limitations contribute to the poor economic status of many of the farms in the county.

In April, REAP-Cumberland was awarded a 2 year grant from the Canada/Nova Scotia Livestock Feed Initiative Agreement to conduct on-farm research into some sustainable agriculture practices. Additional support for the REAP-Canada consultant is being provided by the Cumberland Development Authority. Formal experiments have now been set up on four farms (Ferguson, Firth, Hubbard, van Thielen); in time we hope that more REAP farmers will participate, formally and informally.

The primary goal of the research is to evaluate a number of low input/sustainable practices for their applicability to livestock farms in Cumberland County. The practices were identified by REAP-Cumberland farmers in consultation with researchers David Patriquin (Dalhousie University) and Roger Samson (REAP Canada) as ones that could help overcome specific

limitations to feed production, reduce input costs and protect the environment. Specific experimental details (design of experiments, cultivars tested, seeding rates) were modified as suggested by NSAC, provincial and federal Dept. of Agriculture researchers.

A second goal is to test and develop a "participatory" process for researching and developing sustainable agriculture practices. Thus in this "participatory", on farm research project, farmers are involved directly in the identification of problems to be researched, planning of the research, in the research itself using existing equipment and in evaluation and dissemination of results. This helps to keep costs down, deals with site to site variability and should allow quick adoption of successful practices by farmers.

Outline and rationale of farm trials

The following practices, all of which have been researched initially elsewhere, e.g. in Europe, are being evaluated:

1. Annual Grain Legumes undersown

In trials by Charles Hubbard last year, fababeans and lupine planted in early June gave good vegetative growth but did not give good grain yields because of the short growing season. Both are reported to make acceptable silage. These plants grow slowly in their first month when they are nodulating, thereby allowing good establishment of undersown forage, and the silage harvest provides early removal of the companion crop. No fertilizer or herbicides are required in this method of forage establishment.

Trials in 1990 consisted of: (a) one half acre each of fababeans and lupine undersown with an improved triple mix (Hubbard farm); and (b) a plot experiment in which the treatments were:

1. Encore fababeans (seeded at 120 kg/ha)

2. PEI Common lupine (120)

3. Fababeans & lupine (60/60)

4. Peas and cereal (Lenca peas/Lager barley/Marion oats) (80/50)

5. Cereal (Leger barley/Marionoats, 60/60)

All were undersown with improved triple mix. The plot experiment is being conducted on two farms. The half acre trials were harvested in late August for silage. Performance of the undersown forage will be monitored over 1990/91.

2. Improving Legume Hay Persistence

This experiment tested the use of manure on forage and use of improved mixtures for better maintenance of forage quality and of the legume component. REAP farmers report that the productivity and palatability of triple mix declines after a few years due to decline in timothy and its quality, and to loss of the legume component. We are examining 3 means of reducing this problem: by turning hay over more frequently (see rotation below), by applying manure or compost to maintain fertility (particularly potassium), and by use of improved forage mixes for better persistence of clover. Five different mixtures were sown in 1990 on large plots in each of 3 farms (Firth, Hubbard, van Thielen):

Treatments:

1. Marino red clover/Champ timothy (8 &5 kg/ha)

2. Apica alfalfa/Champ timothy (12 & 5 kg/ha)

3. Marino red clover/Sonja white clover/Sacramento white clover/ Champ timothy (8/1/1/5 kg/ha)

4. Marino red clover/Sonja white clover/Sacramento white clover/Apica alfalfa/Saratoga brome grass/ timothy (5/1/1/2/4/2 kg/ha)

5. Common Triple Mix (13 kg/ha)

3. Winter Cereal Mixtures

Winter cereal mixtures are being tested for winter hardiness, yield and disease resistance, especially after hay. There are many potential benefits from winter cereals (e.g. weed control, winter cover, more grain and straw, better planting conditions than for spring cereals) if they can be grown successfully. New varieties, and mixtures of different species (winter rye, winter wheat, winter triticale) are being tested to see if they will perform better than winter cereals have in the past (very little winter cereal is grown in the county).

4. Catch Crops

A catch crop sown after harvest of a winter cereal can improve weed control, reduce nitrate leaching, improve soil structure and provide a late season supplementary forage. Catch crops being tested this year are oil radish, phacelia, white mustard, Barcoli rape, Typhon turnip, ryegrass and oats.

5. Annual Forage Pastures

Poor midsummer forage production is a factor limping utilization of forage in grazing systems. Annual ryegrass has been used successfully as a means of improving forage production in mid-summer, but high seed and fertilizer costs are limitations to this system for some farmers. As alternatives, we are evaluating spring planted winter cereals (which do not head out) alone and in mixtures with annual legumes for mid-summer forage. Seed costs of the cereals are lower than for ryegrass, and legumes can reduce fertilizer needs and improve forage quality.

Putting It together

Practices (1) to (4) were conceived in relation to the following possible rotation:

Year 1. ANNUAL LEGUME FOR SILAGE, UNDERSOWN

Year 2. HAY

Year 3. HAY

Year 4. HAY/WINTER CEREAL

Year 5. WINTER CEREAL/CATCH CROP

Some of the benefits of the rotation on a systems level are:

- a large legume component (reducing need for N fertilizer);
- placement of an annual legume at a low end of the rotation to stimulate nitrogen fixation (legume N_2 fixation is inhibited in N rich soils);
- a short sequence under hay which should maintain hay quality and minimize fertilizer requirement for the winter cereal;
- almost continuous cover to reduce erosion, increase soil organic matter and conserve nutrients;
- minimal need for tillage in early spring.