Sheep Farmstead Planning

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Farmstead Planning

Whether or not you have expansion intentions, every sheep farmstead should have a plan that is flexible and can accommodate your vision of the future, as well as the next generation's vision, and perhaps the vision of complete strangers (future buyer of your property) as well. Your personal plans may be a machine shed, or replacement or feeder barn, but long range plans that can accommodate two to three times the present flock size should influence where these new facilities go, and perhaps also what they look like. Whether or not you have personal plans to expand, it is inevitable that every sheep farm (if it continues to be used for this purpose) will eventually evolve into a larger operation of several (or many) hundreds of ewes. If short term decisions are made in a way that fits such development, the resulting farm assets will be more valuable to you, to your son or daughter, or any future owner with expansion plans. A sheep operation, which plans to stay in lamb production should have a multiphase plan in place to permit orderly expansion. This plan should include three elements.

- a short-term plan for what to rebuild if a fire or similar disaster destroyed the farmstead, or specific components of it.
- a mid-term plan for gradual improvements or expansion over the next 3-5 years. This plan should incorporate existing facilities.
- long-term plan for what the farmstead may evolve to in 10-15 years. Since technology, and the economic climate are changing constantly the ewe flock size and management system needed in 2015 is not easy to predict. Adoption of labour efficiency technologies in feeding, handling and lambing will probably increase the rate at which flocks grow in size. One suggestion for the long-term plan is that it accommodates up to 2000 ewes. This number is suggested at it would allow for a two family operation (siblings or parents with adult child) at full-time levels plus some expansion. It is probably much larger than what

most of us are comfortable with, but keep in mind that expensive new technology may be easier to recoup from a bigger production base.

A plan for expanding the current operation should exist on paper for several years before any cement is poured. Erasing and redrawing "paper" walls is a very valuable and inexpensive process compared to moving walls of concrete or wood. Extensive paper planning can dramatically reduce the risk of costly mistakes later. A fairly detailed paper plan provides a reference point for further development. It can be used in discussions with advisors, comparison shopping on tours and open houses, operational planning of current farm activities, and implementation of initial stages of the project such as site preparation. Each phase should be well thought out with definite goals, and definite steps to get to each goal. The phases should also tie together to form a natural progression of orderly expansion. The planning process described later gives more information on reaching building decisions. Farmstead planning can be as complex as you want to make it. The more thought that goes into it now, the less chance for mistakes in the future.

The Planning Process

While the planning process should increase in intensity several months before any new construction occurs, it should be ongoing, adjusting to new technology and management needs at all times. This will allow you to look at as many alternatives as possible. In planning a new expansion, make sure it addresses the existing management problems in your present operation, and avoids new problems. Always be thinking, "if I was doing this in my new barn, how would I do it?" The following steps outline a planning process suitable for dairy expansion.

1. **Establish needs and goals.** You will need to determine your wants, needs, and goals as clearly and precisely as possible. Choices may favour labour efficiency, flock health, or low capital cost. Which will be of greatest importance to you? Knowing what you want to achieve will save time and money when you are looking for information and later making purchases.
2. **Collect information.** Collect as much information from as many sources as possible. Go to open houses. Attend tours. Read magazines. Talk to engineers, contractors, nutritionists, management specialists, suppliers, and other advisors about your plans.
3. **Evaluate alternatives.** Be as creative as possible. Evaluate all alternatives carefully, even the ones that seem "off-the-wall", "far-out" or impossible. What is "far-out" today, may be the accepted technology tomorrow.
4. **Plan on paper.** Once the best alternative is selected do as much planning on paper as possible. Discuss your plans with the people that contribute to your on-going operation such as employees, feed suppliers, shearers, veterinarians, etc. as each may have ideas which make their involvement with your operation more efficient. Many people find it easier to react to a specific proposal rather than to abstract ideas, so try to provide good detail. Evaluate your plan for its flexibility for accommodating new technology. Revise and redraw as necessary.
5. **Layout to scale.** One of the best uses for "baler-twine" is to stake out a building to full scale. Often what appears to be a good fit on paper, looks much different when staked out on the site.

6. **Build.** When and only when you have "covered all the bases" is it time to build.

This process may not apply to every project, but many parts of it will. At any step in the process it may be necessary to "go back to the drawing board" and repeat a previous step or two when something doesn't work out the way you thought it should.

General Layout and Facilities Needed

Most sheep farms focus on the number of breeding ewes, but if all livestock are to be housed on the farmstead, facilities must be planned for many classes of animals. Management groups will be based on age, size, nutritional requirements, etc. On smaller operations several different groups may be housed in the same facility, but managed separately. On large farms, each group may be housed individually. Facilities need to include feed and manure storage and a place for animal handling and processing. While some functions may be combined in a single building, typical components include:

1. Late gestation and lambing barn
2. Lactating barn (or pasture)
3. Utility and office
4. Handling, shearing and animal loading
5. Dry ewes (maintenance)
6. Feeder lambs
7. Replacement ewe lambs
8. Rams and teasers
9. Feed storage
10. Manure storage

Once the goals and the master plan have been decided on, the interaction with the existing farmstead can be determined. For instance the relationship with the living area, existing buildings, if any, and other areas, such as machinery storage will need to be established.

Building New Versus Renovating

One tempting way to reduce building costs is to renovate existing buildings. Large single storey free span truss style buildings can be suitable for conversion into sheep housing. However, many of these buildings already have well defined and profitable uses. There is little sense in converting a machinery shed only to find that you now need to build a new machinery shed somewhere else. Two storey bank barns may have sentimental value, but their low ceilings and variety of post spacings do not lend themselves to standard stall sizes and layouts. Achieving good ventilation in these older barns is a challenge, if not impossible and is probably one of the major health issues in the sheep industry. While the commitment to modest expansion remains (30% or less), extending the barn is a logical option, but if a commitment to major expansion is made a new barn is in order. The old bank barn may be best left empty or used for a handling and storage area. Other uses include sick-pens, ram or replacement housing. Since old bank barns present a major fire risk, it is definitely not wise to attach new buildings to them. Also planning the new facility around existing buildings may greatly limit future expansion. The Factsheet "Renovating Livestock Barns - A Management Decision" provides some interesting insights when asking the question, "should I renovate?"

Site Selection

Although we would normally think of site selection as an exercise involving a single farmstead, in the broader context it could mean building in Southern Ontario, vs. New Liskeard area, vs. Alberta, New York, Australia or anywhere else in the world. If your decisions are driven primarily by economics it may be very worthwhile to assess the economic climate including lamb prices, land values, marketing (trucking) costs, feed production capabilities and taxes in other jurisdictions. Present and future restrictions such as environmental regulation and urban rural conflict may also be factors in considering alternative "sites". In terms of immediate profitability, relatively high land prices make South-western Ontario less attractive than several other jurisdictions right now. There appears to be little interest in North-eastern Ontario which has good land priced at $1000 or less per acre, less urban pressure and only slightly poorer access to Toronto's strong lamb markets. Such an area should look more attractive as Alberta, with similar land prices but poorer long-term market access. In the longer term Southern Ontario has many natural advantages including productive cropland and good location relative to markets. Urban pressures may be the greatest future concern in many parts of the province. With excellent crop yields a land base of 1/8 to 1/4 acre per ewe is needed to utilize manure nutrients. At current land prices, few sheep farmers see economic benefit in owning a large land base, but in spite of this, sheep farms in Ontario may need to focus on ensuring long term access to 200 to 300 acres of land, before undertaking expansion plans.

Most of us are strongly influenced by social, cultural and community factors and will not likely look at site selection from a global perspective. This does not mean we need to restrict ourselves to the present farmstead. If the lack of a suitable site, inadequate land base, restrictive zoning, or any number of other factors make the existing farmstead unattractive for long-range plans, it may be very advisable to relocate now, perhaps within the same farming community.

Selecting the site for new facilities is an integral part of the farmstead planning process. The topography and soil type of available sites may influence building design. Conversely the building type can dictate where it should be located. For example, if the available sites require a lot of fill to bring them to a desirable elevation, a slatted floor barn with under the barn manure storage may look more attractive than other manure handling options. On the other hand, if a high well drained site with clay soil is available, a bedded pack manure system is more attractive. Some sites may require a site characterization study under the *Nutrient Management Act* regulation O.Reg.267/03 as amended.

While existing buildings may be part of the plan they should not unduly influence the location of new ones. It may be convenient to renovate and connect buildings together, but this may adversely affect ventilation as well as creating an increased fire hazard in the new building. It may also limit future expansion and increase traffic problems. Particularly for shepherds with a purebred, hobbyist or dairy tie stall background, choosing the right site for a modern commercial sheep barn involves a change in philosophy. In larger systems, most work is done from a tractor cab or other automated tools such as feed carts. Having things close together is of little benefit. In fact "not enough room to turn around" is more commonly a

commonly a concern than "too far to walk".

Important factors in site selection and development include zoning and regulations, topography and drainage, wind and snow control, capacity for expansion, location of roadways, electrical service and existing buildings, security and visibility, availability of water, soil type, and access to land especially relative to manure application.

Topography and Drainage

An ideal building site for livestock housing will be higher than the surrounding area to promote good ventilation and provide natural drainage of rainwater and snow melt away from the building. Keep floors in buildings above the surrounding grade for the same reason. It is desirable to incorporate sloping floors into most livestock facilities. Using the existing slopes and undisturbed soil to advantage can reduce excavation cost and minimise risk of variable settling. A 1% slope throughout the length of the barn will encourage manure liquids, lambing area wash water and spills from water troughs to drain away to the low end of the barn. A slope of 3% or greater will encourage cows to lay with their backs uphill; but how might this affect sheep? When all cows lay the same way in free stalls, there is less contact between hooves and udders and cows are cleaner; perhaps this is something to consider in lambing barns as well. There are three construction options for incorporating the slope in the building. It is possible to slope the floor and not the roof line, creating a variable height in the side wall. A second option is to slope the floor and roof line but keep the posts vertical. This means roofing steel does not go on square. Lastly the entire building including vertical posts can be built rectangular, but off level. All three options can be structurally sound and the choice is one of individual preference. 1% or greater slope in a bunker silo or commodity building will ensure liquids drain away from the face of the feed. Where the site permits it, there are definite advantages to locating manure storage downhill from the barn so that manure can be moved by gravity. If the storage is part way down a slope it may also be possible to unload it using gravity. The *Nutrient Management Act* regulation O.Reg.267/03 as amended has specific requirements with respect to distance to watercourses and how runoff is treated.

Soil Type

A stable soil is needed to support buildings, bunker silos and driveways. With soils of higher clay content, site preparation such as re-grading should be done a year or more in advance if possible to permit settling, or alternatively the site should be thoroughly packed. Earthen manure storages require soils with suitable clay content, and must be constructed following proper construction standards.

Wind and Snow

Barns that depend on natural ventilation should be located on an exposed site away from other buildings, and oriented so that the sidewall catches the prevailing westerly wind. Ideally, attached handling facilities or other utility rooms will be located on the downwind side and have open side walls to minimize interference with air flow. Where this orientation is not practical, additional openings in the end walls should be provided. Use of chimneys instead of open ridge ventilation outlets is advised for all barns but more critical when the

ridge is not perpendicular to wind direction. Buildings or trees within 200 feet upwind will interfere with light summer breezes which are essential to summer ventilation of barns. (For wintering yards, trees should be about 30-50 feet upwind to provide appropriate wind shelter, but less than 10 times the tree height away. Try to determine the pattern of wind and snow around proposed buildings, when planning. Wind is important for carrying odours, noise and dust away from living areas. Ideally, manure storage should be down wind from nearby residences.

Access and Security

It is important to have good road access for feed delivery and livestock haulers, etc. For security reasons, it is best if all traffic has to pass within clear view of the residence before accessing the facilities. It is also important to have easy access between the livestock centre and fields for feed and manure moving. In areas where there is potential for conflict between livestock farming and other land uses there may also be merit in choosing a building site which is less conspicuous from heavily travelled roadways. Figure 1. illustrates basic principles of farmstead planning in relation to prevailing winds and major road access.

Expansion Potential

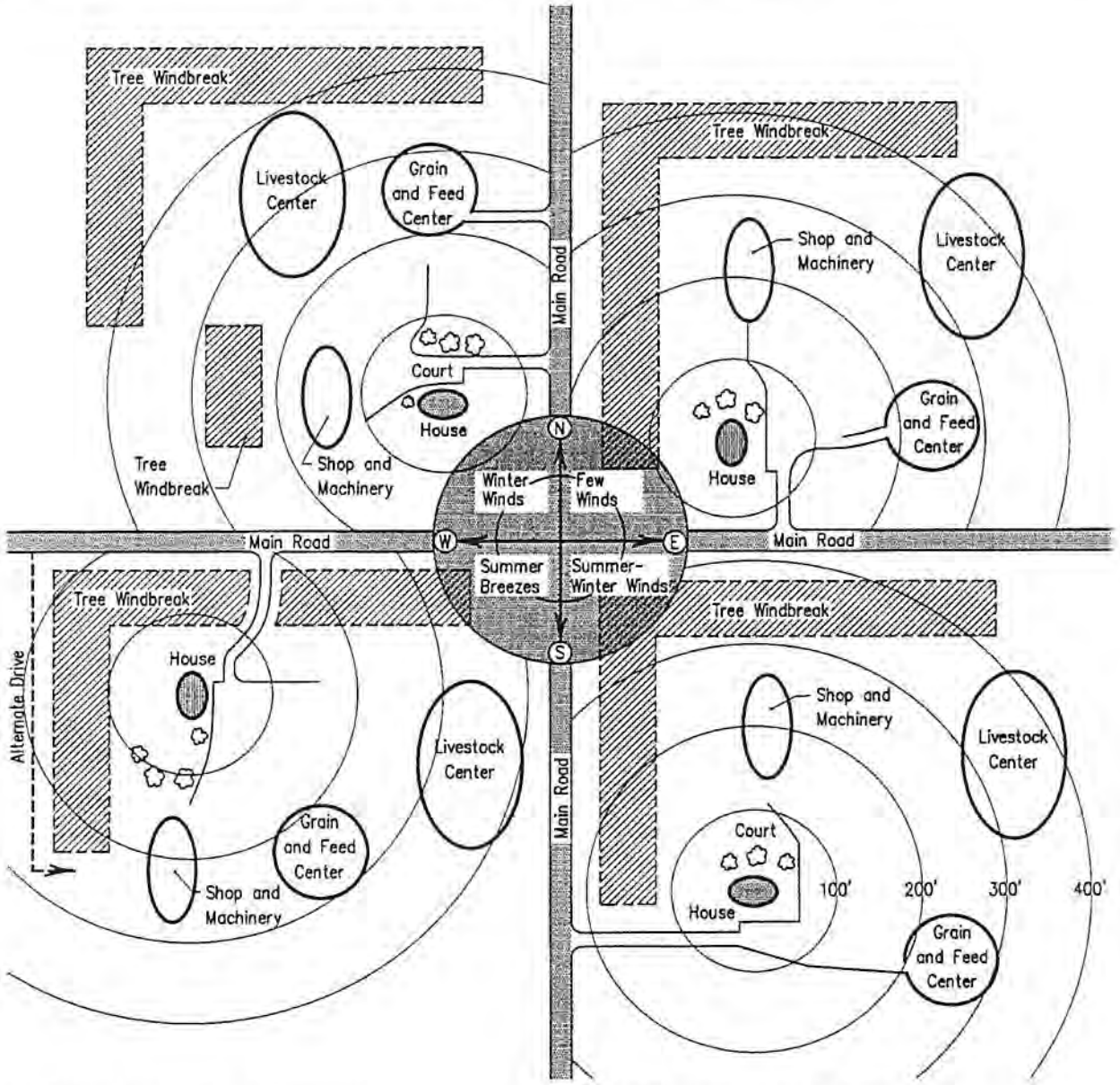
When selecting a site always keep expansion in mind. Ideally a site should provide for unrestricted extension of barns, and commodity sheds at both gable ends. Bunkers should have the option of becoming longer or having additional silos added to the sides. As stated earlier an ideal site should be expandable to about 2000 ewes without major problems. Remember that in a commercial sheep operation there should be little carrying of feed, so distances are not detrimental. Leave lots of room to turn at both ends of the drive through and in front of bunkers and commodity sheds. The dairy barn plans in Fig. 2 provide illustrations of design aspects that provide flexibility for future expansion; concepts that apply to sheep.

Water

An adequate water source is necessary not only to supply drinking water to the sheep, but also for sanitation. Not only is it necessary to be able to supply the total water requirements, but also the peak water requirements that occur just after feeding (especially grain).

1a. Farmstead west of the road.
Some winter winds come from the northwest. Locate the house as far west and the livestock area as far north as practical.

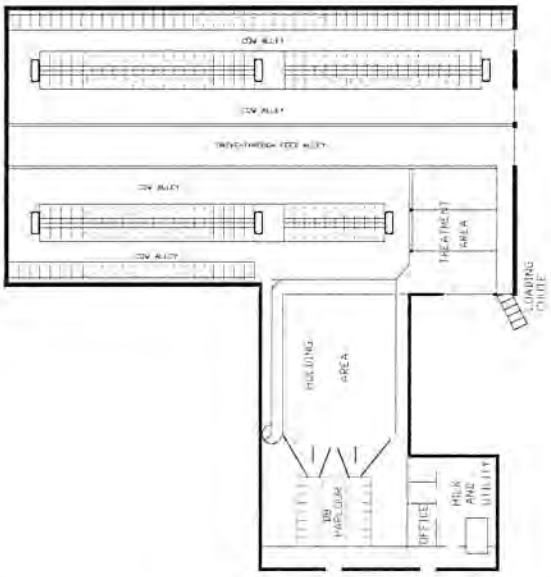
1b. Farmstead north of the road.
A good relationship between house, windbreak, livestock center, and main road is easy with this layout.



1c. Farmstead south of the road.
A curved drive avoids a straight cut through the windbreaks. Moving the house farther south and the livestock area northeast is desirable. If the house and machine center can be reversed, use the alternate drive.

1d. Farmstead east of the road.
As in Fig 1b, a good layout is easy, assuming drainage and other factors permit this arrangement.

Figure 1. Farmstead and main road relationships (MWPS-7: available in MWPS-3).



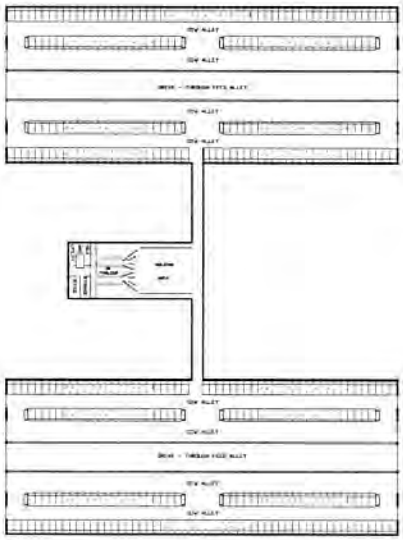


Figure 2-A. Layout permits dairy barn expansion off barn to right, milking parlour (handling facility) to the bottom.

Figure 2-B. Layout permits expansion in four stages, top left and right and bottom left and right.

Manure Storage and Application

Choose a site that has adequate space for the size and type of manure storage that is presently needed plus room for expansion. It will be necessary to check with the local municipality to determine if there are any by-laws that regulate the size and/or type of manure storage that can be constructed. You must also take into account the siting and sizing requirements set out in the *Construction and Siting Protocol* of the *Nutrient Management Act* regulation O.Reg.267/03 as amended.

Be careful to select a site where prevailing winds will blow offensive odours away from the living area of the farmstead, and away from neighbouring residences.

The site should also be selected to provide for easy transfer of the manure from the livestock barns to the storage. It is also necessary to have easy access for transportation from the manure storage to the fields.

The site must also have an adequate land base for application of the manure. OMAFRA's Nutrient Management Computer program can be used to determine the acreage necessary to spread the manure. More information on nutrient management planning is available from the Factsheet "Nutrient Management Workbook". The field topography is also important to minimise the risk of pollution from land applying the manure. Select land with minimal slopes away from surface watercourses. Be sure to keep in mind wind direction and neighbouring residences when applying manure.

Feed Storage and Handling

Just as with manure storage it is important to have adequate space for the present feed storage and for room for possible future expansion. Feed storage must be located for easy access to the source of feed, and for easy access for mixing and delivery. With the use of mobile feed mixers, feed can be conveniently moved greater distances. While trailer TMR mixers make it possible to locate feed storage further from livestock buildings, do keep in mind that convenient feed preparation happens when there is a "feed centre" where the mixer can be parked while a loader adds most ingredients. This means commodity storage, bunker silos and small ingredients need to be planned into one site.

Regulations and Guidelines

Besides the physical planning, and site selection, there are a number of different regulations and guidelines that will affect the potential building site as follows:

Building Permit - All municipalities will require a building permit. The information required for this building permit may vary from municipality to municipality, so be sure to check exactly what is required for your area.

Table 1: Example separation distances for new and expanding sheep barns

	Nutrient Units	*Distance from Barn and Covered Manure storage to nearest neighbour*	*Distance from runoff storage to nearest neighbour*
New			
1000 ewes + 1000 feeder lambs	**175**	**215 m (704')**	**234 m (768')**
2000 ewes + 2000 feeder lambs	**350**	**273 m (897')**	**292 m (957')**
300 Existing Ewes – Expanding to:			
1000 ewes + 1000 feeder lambs	**175**	**190 m (623')**	**210 m (690')**
2000 ewes + 2000 feeder lambs	**350**	**242 m (794')**	**261 m (856')**
Distance to lot line is 10% of above Distance to road is 20% of above Distances to areas zoned residential and institutional are twice above			

Most municipalities will require an engineer stamped design for the building to ensure it is structurally adequate. Most municipalities will also require some sort of separation between the new building (not yards) and adjacent land uses. This separation distance may take the form of a fixed distance or it may be calculated using OMAFRA's Minimum Distance Separation II (MDS II) formula. This formula is being adopted by most municipalities and all will have to use this as a minimum standard whenever their regulations are next updated. It is based on the type of livestock, type of manure system, and degree of expansion. The current formula was revised in Fall of 2006 and uses the same base number of Nutrient Units as the

Nutrient Management Act, where 8 ewes (replacements and rams not counted) are equal to one Nutrient Unit. This replaces the previous approach were 4 ewes equalled one Livestock Unit (LU) for MDS. In other words the new system is more 'sheep friendly' with regards to reducing setback distances for sheep relative to cattle for example. The new format however, affects yards. MDS I provides the reciprocal distances to keep new developments set back from existing barns.

Manure Storage - Some municipalities also have requirements on the type and size of manure storage. For instance you may be required to have at least 240 days of manure storage. Manure storage standards are also covered under the *Nutrient Management Act, 2002*. The details can be found in the *Construction and Siting Protocol* that is part of O.Reg.267/03 as amended.

Manure Utilisation - Municipalities may also have land base requirements for applying manure. These may be specific to the municipality or based on the requirements for OMAFRA's Nutrient Management Program, in which an individual plan must demonstrate manure is applied in a manner which is conducive to utilisation by crops and prevents pollution. Such a plan could include off-farm sales of manure, etc. The process of nutrient management planning is outlined in the Factsheet, "Nutrient Management Planning Workbook". OMAFRA also has a computer program which is designed to simplify nutrient management planning. While individual plans vary, a typical rotation of corn and alfalfa with average yields (105 bushels corn) will require about 1/4 acre (solid manure and liquid runoff) per ewe to use all the manure nutrients produced. At high crop yields (150 bushels corn) this can be reduced to 1/8 acre per ewe.

Manure application standards are covered under the *Nutrient Management Act, 2002* in the regulation O.Reg.267/03 as amended.

Farmstead Planning Exercise

Sample Farm *(or use your own)*

- Currently at ~1000 ewes; 950 Rideau + 50 Terminal breed
- Farming at current location since 1997
- Using an accelerated system
- Five-point Star at present, but will use a 3-in-2 system for next year
- Heavy pasture focus
- Significant proportion of cropping and manure management on a custom basis

Exercise

There are no rules, provided all the points are addressed. Create expansion plans for each scenario that include:

- barn locations and relative sizes,
- silo type (bunker, Ag Bag, etc) and locations,
- commodity storage location and type,
- feed preparation areas,
- handling facilities
- utilities (water, sink, shower, office),
- site-limiting factors (wells, surface waters, bedrock, residences), and
- approximate farmstead layout

Scenario A: The entire farmstead (livestock buildings and silos) is destroyed by fire or extreme weather including 30% animal death-loss and must be rebuilt to current capacity.

Scenario B: The farm intends to undergo a modest (20% expansion) over the next three years.

Scenario C: The farm intends to undergo a significant expansion (doubling).

Scenario D: The farm intends to undergo a significant expansion (tripling) that involves a second family and their residence.

Points to ponder:

- What features (natural or man-made) at this site limit expansion and re-sale?
- How will transition through the above 4 scenarios be accomplished?

Summary

The importance of planning cannot be stressed enough! It takes time, but it is time well spent. The authors have never heard a producer at the end of a project say that he/she wished that they hadn't spent so much time in planning.

Financial planning hasn't been discussed in this Workshop, because it warrants a separate module of its own. It is a vital step in each part of the decision making process, and must not be ignored.

When the project is finished, you will realise that there is something you could have done better. There always will be. If it can be corrected, do so. If not, don't dwell on it. If someone asks you what you would do differently if you had the chance, share your experiences. And.....never stop planning the next phase of your future!

Other Resources

- **Sheep Housing and Equipment Handbook**, Fourth Edition 1994. MWPS-3
- OMAFRA Factsheet - Feeding Systems for Sheep 2003. Agdex 430/50, Order# 03-013
- **Agricultural Pollution Control Manual** 1994. OMAFRA Publication.
- OMAFRA Manure Storage Sizing Computer program (MSTOR)
- OMAFRA Nutrient Management Computer program (NMAN)
- OMAFRA Factsheet - Structural Aspects of Renovation 1997. Agdex 714 Order# 97-013
- Ontario Regulation 267/03 (**Nutrient Management Act**) as amended