Forage Guide for Modern Forage Systems

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A GUIDE TO SELECTING, PLANTING, AND MANAGING FORAGES FOR PROFIT

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A GUIDE TO SELECTING, PLANTING, AND MANAGING FORAGES FOR PROFIT

Introduction

The management of forages is challenging but we need not make it overly complicated. Animal nutritionists are now emphasizing the need for feeding only the best quality forage to get the best livestock performance. Even for livestock being fed substantial amounts of grain, there is a move toward greatly improving the quality of forage being fed. This is true for both confinement feeding and pasture-based systems. This is being accomplished through harvest and storage management as well as the use of genetically modern forages.

The importance of forage management has greatly increased in recent times. Grain, partially a substitute for high quality forage, can no longer be counted on to be inexpensive. The price farmers receive for their products have generally not kept pace with inflation. Many livestock farms using confinement feeding systems have improved their timeliness of harvesting forages and their storage management. Many farms have chosen to move to MIG (management intensive grazing). This has enabled both types of farms to reduce costs and, in many cases, increase production. These improvements were based mainly on utilizing our existing forages.

Historically the United States has put great emphasis on breeding crops such as corn, soybeans, and alfalfa. North America has been surpassed when it comes to other forages, particularly grasses. Europe and New Zealand retained a forage-based agriculture because they never had the advantage that the United States had in grain production. World economics are changing and most domestic seed companies are trying to catch up.

In the late 1980's Modern Forage Systems, formerly of Ferndale Washington, a pioneer in the search for better grasses, first turned to New Zealand for improved grasses. New Zealand has some of the finest pastures in the world. New Zealanders also were not bashful in pointing out some of our needed improvements. Many varieties are now being imported from New Zealand and are improving North American forage stands.

The Netherlands (Holland) came into the picture later on when it was found that their grasses were just as superb as New Zealand grasses. This small and beautiful country is Europe's leader in forage seed development and production. Their grasses offer the advantage of greater winter hardiness and later maturity as they were bred for continental Europe. Many of their varieties have been tested and top rated in both United States and Canadian studies.

Why Foreign Grasses?

It should be clear why progressive farmers are turning to New Zealand and European grasses. These places only grow the best. Their seed industry, of which Barenbrug is a leader, invests

heavily in developing the varieties, and there are intensive university and government trials to prove them out. Their forage based livestock systems depend on high quality forages. One pound

of high quality grass can produce one pound of milk in a dairy cow! The return from grain feeding is considerably less.

Planting and Managing Forages for Profit

Management Most Important

New varieties may do as well as the management applied to them, but no better. MANAGEMENT IS KEY TO ALL FORAGE PRODUCTION. First learn to manage well what you now have before you tear up the whole farm! Even the worst stand can be improved with good management. Good management means doing those things which create a good growing environment. Key components to a good growing environment include freedom from compaction, good drainage, adequate fertility and pH, ample soil organic matter, and proper harvesting techniques. These principles apply to most growing plants. Many farms have very beautiful lawns and vegetable gardens but so-so pastures and hay fields. It always boils down to the same thing. The lawn gets fertilized, aerated, irrigated, has the weeds removed, and is mowed before seed heads emerge. Treat your hay land and pastures like a big lawn. Once you have management under control, then it is perhaps time to introduce new and better species or varieties.

A good practice is to always grow some of your new bought seed in a flower pot or in your garden so you can identify your new plants in the field. This is also a good check of germination.

Establishing New Pastures

A grazing convertee had bought some very special seed from Holland and planted 40 acres. Instead of a solid mass of shimmering, emerald green ryegrass he achieved a disappointing 65% stand. Telltale 6" wide rows and large gaps were evident, the results of using an old grain drill to plant his seed. The mistake is not fatal. Expensive yes, as seed and productivity is lost. Improper seeding is one of the most common errors in establishing forage stands. AGAIN, THINK OF PASTURE AND HAY FIELDS AS A BIG LAWN. Everyone knows how to plant a lawn. We work up a fine seedbed, fertilize and lime it, then roll it so it is firm enough to retain moisture for the seedlings. Seed is then broadcast with a spinner or a free fall drop seeder. The seeds need to be randomly spaced all over the surface. *(Note: Oregon State University recommends coverage of at least one seed every square inch for a good forage stand.* *See page 9.)* The seed pattern is checked for uniform coverage and more seed is added if necessary. WE THEN RAKE LIGHTLY TO COVER THE SEED ABOUT 1/8TH OF AN INCH, THEN ROLL IT AGAIN. This ensures good seed to soil contact allowing life sustaining subsurface moisture to wick up and nourish the seedling.

The biggest single cause for stand failure is overworking the soil and inadequate surface packing. Ever notice how seedlings will often grow better in the tractor wheel tracks? In trying to get a fine seed bed many farmers end up with a soft, fluffy, flour-like seed bed caused by excessive tillage. Rototiller mania! This is a disaster waiting to happen as this fluffy layer is a moisture barrier preventing the subsurface moisture needed to germinate the seed from moving

upwards reaching the seed. (Ask the cook what happens when you dump water in a bowl full of flour. It just sits on the top and will sit there until it is mixed together.) To prevent or minimize this, it is recommended that the seed bed be tilled only enough to create ***pea size*** soil particles, then rolled or cultipacked both before and after planting! Without packing, the seed may germinate but might not have enough moisture wicking up through the soil to grow. A firm and moist seed bed is preferred.

Planting with grain drills may be acceptable for the establishment of fields used for hay. They are not preferred for the establishment of improved pastures. They place seed in 6-7" rows and often plant grasses too deep. Pastures need to be uniform to form a dense sod for high production and to support the livestock. If you must use a grain drill, seed very shallow, and seed in both the NS and EW directions. When using a seed drill, press wheels can be used and will frequently improve stand yields by 15%. Super grass stands are frequently established with spin seeders or grain drills with the bottoms of the tubes loose and scattering the seed, a chain harrow, and a cultipacker or heavy roller. The Brillion brand of cultipacker-seeder is excellent to use. The field can be cultipacked first and then seeded and packed on the second pass.

Easy Ways to Plant

Everyone seems interested in easier ways to establish or renovate pasture other than with a full tillage program. Complete tillage achieves the best results and all other methods less. For discussion, let us consider full cultivation as 100% effective. **Yes, there are other ways to plant.** The most basic method is **frost seeding** which relies on the early spring freezing and thawing of the ground surface to work the seed into the soil. Clovers are the seed of choice and annual or perennial ryegrasses also do well. Generally, other cool season grasses such as tall fescue, orchardgrass, timothy, brome, and reed canary just aren't aggressive enough to compete with the existing stand. This is also true of most legumes. Frost seeding may be 25% effective on average. This number, seemingly unpredictable, can range from 0 to near 100%.

Next up the effectiveness scale is **broadcasting** in the early spring or late fall, followed by harrowing and good cultipacking or rolling. This covers much of the seed and gives the seed its needed soil contact. This method often gets good results with maybe as high as 50% seed establishment.

No-till seeding is next up the ladder. Using herbicides, one can establish most, if not all, grass species into either a killed sod, or into a still living but burned back stand of existing forage. Clovers respond well to no-till methods while other legumes can be more of a challenge. Get local recommendations from you area Cooperative Extension Service. Good results are often obtained when no-tilling ryegrass without the use of herbicides. It is important, in this case, to drill into very short grass, either just after mowing or a close grazing. No matter what method you use it is important to keep machinery and livestock off the field until the seedlings are established and firmly rooted, or you risk ending up where you started. This is why many people choose to do their renovation in the fall (late summer) and remove the livestock for the season. This gives the seedlings a chance to grow without damage. We recommend the Aitchison SeedMatic™, a special New Zealand made no-till drill. It is designed to drill seed into an

existing sod, which makes it unique. It does a great job and can achieve upwards of 80% germination. (www.tigercoinc.com)

One method of establishing a new pasture is the oft forgotten **chisel plow**. The chisel plow is superior because it breaks up and stirs the top six inches of soil without inverting it and burying the topsoil, the surface fertility, and microorganisms. Here is a low-tech seven step method, which doesn't use an herbicide:
#1 Get the grass short.
#2 Irrigate (if dry) to make the soil moist or wait for a good rain so the soil will pack.
#3 Chisel plow in NS and EW directions breaking up the existing sod.
#4 Rototill (shallow) just until the sod clumps and soil clods are broken up. Some lumps are OK and unavoidable. Do not over-work the soil!
#5 Cultipack the ground until it is firm.
#6 Broadcast seed at the high end of the recommended seeding rate.
#7 Cultipack again in NS and EW directions.

If perennial ryegrass is planted, the new pasture will be 95% new grass and 5% old. Other species will be less successful, probably resulting in 80% new and 20% old. The method is quick and simple, and the pasture is back in service in less than 12 weeks with perennial ryegrass and perhaps 16 - 20 weeks with other species such as orchardgrass and tall fescue as these species are slower to establish.

In northern areas (and in southern areas especially for KY-31 eradication), it is common to kill an existing stand using herbicides in the fall. The existing sod has an opportunity to die and decompose over the winter. Frost seeding is not recommended in these situations but the amount of tillage required to establish a good stand may be reduced.

When to Plant

Farming may be considered a form of gambling. Risk and potential disaster loom everywhere. Mother Nature is the boss and our survival is in her hands as well as ours. She can punish us at will with bad weather, weeds, vermin, pestilence and other uglies. With this in mind, planting no matter when, has its risks as well as benefits. Traditional plantings are made in the spring or late-summer and early fall. Excessive moisture which prevents early planting, and weed competition are the risks of spring. The big benefit is that the seedlings have sufficient time to establish to reduce the risk of winter kill. The opposite is true for late-summer and fall planting. Although the fields are usually dry enough for timely seed bed preparation, lack of timely rain may delay seed germination to the point where it places the emerging seedlings at risk of winter kill. Farmers with irrigation don't face this problem as they can provide their own moisture. Those that live in areas with mild winters can wait for the rain to arrive with low risk. The benefit of fall planting is that you get a big jump on having early use of pasture or a full hay production season next year.

There is another system of planting called fall dormant. It is a compromise between spring and fall planting. This is really the way Mother Nature does it. With this method, planting is delayed until the onset of cold weather, which drops and keeps the soil temperature below 40° F, thus keeping the seed dormant. The seed sits through the winter and awaits spring warmth. This

method normally gets a big jump on spring planting, gets ahead of some weeds, and largely eliminates the winter kill problem, but can have drawbacks. Unusually warm late-fall or early-winter weather could cause the seed to germinate and then freeze. Soils prone to runoff and erosion may not be good candidates for fall dormant seeding.

Establishing and Maintaining Soil Fertility

When working with perennial forages, soil fertility is vital because it affects the quality of the forage that the animal eats. Animal health and production is related to the nutrients the animal receives from the forage. The best way to determine the fertility level and corrective fertilizer requirements of a current or future pasture is from a **soil test**. Soil tests tell us the soil pH; nitrogen (N) recommendations; phosphorus (P) and potassium (K) levels and recommendations; as well as secondary and micronutrient status. For a new pasture, soil tests samples should be collected and analyzed well in advance so the types and quantities of recommended fertilizers can be incorporated into the soil at the time of field preparation. At this same time, lime should be applied to achieve a soil pH of at least 6.3. *(Note: on a new full cultivation seeding of a field with a pH range of 5.8-6.5, applying 4 tons/ac of lime followed by working it into the soil along with the fertilizer suggested by the soil analysis would not be excessive, followed by an annual top dress of 2 tons/ac.)*. In addition to correcting pH, lime is a source of valuable Calcium, which all living things require. To see what effect pH has on utilization of N,P,K and how much is potentially wasted see the chart below.

Fertilizer Utilization Chart. Without the proper pH, fertilizer cannot do its job. It is imperative that the pH be adequate to limit the amount of wasted fertilizer. (Source: Chris McCracken, Barenbrug, USA.)

% FERTILIZER UTILIZED

% WASTED

SOIL pH	Nitrogen (N)	Phosphate (P)	Potash (K)	
Extremely Acid 4.5 pH	30%	23%	33%	71.34%

Very strong Acid 5.0 pH	53%	34%	52%	53.67%
Strongly Acid 5.5 pH	77%	48%	77%	32.69%

Medium Acid 6.0 pH	89%	52%	100%	19.67%
Neutral 7.0 pH	100%	100%	100%	0 %

NOW YOU SEE WHY SOIL pH IS SO IMPORTANT --$$$$$$$$

(*Note: Nutrients in fertilizers are stated on the labels. The percentage of actual N, P, and K is expressed as a ratio by weight and in the order of N-P-K. E.g., a 10-10-20 fertilizer contains 10% N, 10% P and 20% K. Thus 100 lbs of this fertilizer contains the actual element (in unit lbs) of 10 lbs/N, 10lbs/P and 20lbs/K with the remaining 60 lbs being filler. Urea a common form of N is rated 46-0-0 which yields 46 unit/lbs of N per 100 lbs of fertilizer.)*

The pH of the soil is important, but why the pH is what it is, should be considered more important. The base saturation levels of Calcium, Magnesium, Potassium, Sodium and Hydrogen levels determine the pH. <u>You can have a high pH and still have a shortage of Calcium in the soil.</u> Calcium however, is the one element that drives the production of quality forage. A good source of Calcium is Gypsum, which is Calcium Sulfate. Sulfur is also very important for creating high quality proteins in forages. Most soils are low in this element.

All grasses need nitrogen (N) on a periodic basis during the growth cycle to attain and maintain optimum production. Nitrogen is a consumable fuel just like gasoline is to an engine. It is consumed daily as the plant grows. This is true even when grasses are planted with clover or other nitrogen fixing legumes. Legumes are a money saving source of N especially during the summer and should be used where

possible. Alice white clover can provide up to 150 unit/lbs of N per acre/year. Even with clover, optimum production still requires about 150-200 unit/lbs. of supplemental N per acre/year. This assumes that the proper levels of Phosphorus and Calcium are present. Without these, the performance of N alone is greatly reduced. Apply 50 unit/lbs of N in the spring as soon as the soil is 50 degrees or warmer, with the remainder applied in 3-4 equal doses throughout the growing season, but not later than mid-September. N should be applied with moisture, either from irrigation or rain for the best results. On established pastures, take a soil test every 2-3 years, then top dress on the recommended levels of P and K in the fall, allowing winter action to incorporate.

Persistency of forages is related to balanced fertility. A healthy plant is more likely to tolerate the stress of winter and summer. All plants and animals need balanced fertility (nutrition.) This includes micronutrients as well. Constant removal of nutrients resulting from harvest of crop and pasture has left some soils very low in micronutrients (copper, zinc, manganese, boron, etc.) Do not let the word "micro" deceive you. You do not need much, but you do need enough.

Call your local Extension Agent for details on where to get a soil analysis run. If, for some reason, a soil test is not possible, a reasonable pre-plant fertilizer recommendation is: N = 30 - 40 lbs.; P_2O_5 = 70 lbs.; and K_2O = 50 lbs. of unit/lbs of N, P, K (nitrogen, phosphorus, and potassium, respectively) per acre.

Seeding Rates

Seeding rate is extremely important in establishing a good forage stand. University Extension staffs and USDA-NRCS conservationists frequently discuss this topic. Much of their information is outdated because it was developed for less intensively managed hay crops or for conservation plantings. Agriculture Canada recommends seeding rates that are at least double ours! Their recommended tall fescue seeding rate is 35+ lbs./acre. A gimmick to sell seed? No. Most seeding recommendations were developed when good annual hay crop yields were 2-3 tons per acre in the North. Today these same fields can produce 7 tons of hay per year. It comes from higher inputs, including seed. With grazing, part of the high seeding rate comes from the need to have a dense sod to support livestock. Hay fields don't tiller (grow new shoots) as much; higher seed rates are needed to make up for this. Remember the Oregon State University recommendation that seed be planted the minimum rate of one seed per square inch. Let's review what that means for seed rates.

1 acre = 43,560 square feet or 6,272,640 square inches

Species	Seeds per pound	Seeding Rate @ 1 seed/sq. inch
perennial ryegrass	227,272	27.5 lbs.
orchardgrass	454,545	13.8 lbs.

tall fescue	181,818	34.5 lbs.

As conditions and germination are never perfect, 10% should be added to the recommended seed rates given in the table for precision seeding. For broadcast seeding, add 20%. High quality, high yielding forages will supply a return for years to come. The decision is yours.

Managing the Young Seedling

Careful stand management during the first year is essential for long-term productivity. Most perennial forage grasses are bunch grasses. A single shoot is produced from a single seed. As this shoot is bitten or clipped off, the plant sends up multiple new shoots or tillers from the (basal) buds at the base of the plant. Likewise, as these new tillers are clipped, more tillers are formed creating an ever-larger bunch. This tillering and bunching continues until the spaces are filled, forming a dense, leafy stand. The tillering process is triggered by the basal buds receiving periodic exposure to sunlight. To maximize tiller growth during the first year, the height of the pasture should be maintained in the 3 to 10 inch range to allow maximum sunlight penetration. Once the newly seeded plants are firmly rooted, they should be lightly grazed or machine mowed several times before heavy use to promote tillering. *(Check to see if the plants are firmly rooted by grabbing plants near the middle with your thumb and forefinger and pulling. If the plants break off they are ready for grazing. If the plant pulls out of the ground, mow again then check again when the plants reach grazing height.)* Do not graze or clip shorter than 2 inches, and do not allow the stand to grow taller than 10 inches. Defer making hay if possible until the second year. Once established the pasture should be grazed starting at the 6-inch height, leaving a 3-inch residual, or machine harvested for green chop, hay or silage at the 10-12 inch range. Don't let it get too tall! Graze or mow to keep the stand leafy and vegetative. The leaf contains the nutrients and, up to 12 inches in height, the plant is 90% leaf. When allowed to grow taller than 12 inches, the quality drops dramatically as the plant switches from producing nutritious leaves to being reproductive, as evidenced by the production of reproductive stems and seed heads. Management should be aimed at maintaining a dense, leafy pasture cover.

To enhance production, the tactical application of 50 lbs./acre of nitrogen is recommended at the start of spring to jump start early growth, and periodic (monthly if possible) applications of 30-40 lbs./acre timed with rainfall or irrigation made during the summer to maintain production during this stressful heat period. In mild winter areas an early fall application of 50 lbs./acre can

extend the grazing period well beyond the normal season. Cold winter survival is enhanced by entering winter with the grass left at a short, but still green length of 4-5 inches.

Effectiveness of Management Intensive Grazing (MIG)

Farmers frequently ask for information regarding the sort of production and stocking rates one can achieve using Holland and New Zealand grasses in combination with Management Intensive Grazing (MIG). One could write a book on the subject and fortunately several good ones have been written. The best books are generally available through The Stockman Grass Farmer monthly publication (Jackson, Mississippi; 800-748-9808).

A short illustration of the potential productivity of improved species and varieties of grasses follows. A farmer called wanting to know just how many 500 lb. heifers he could carry on 800 acres of irrigated pasture. A New Zealand intern working for Modern Forage Systems worked up the information requested and replied:

"Dear Mr. X:
I am a New Zealander on exchange in the U.S.A. working for John Kaye. John asked me to put something together for you. Hope it will help.

Assumptions:

*You know and understand MIG and will apply it.
*800 acres irrigated, good fertility, and drainage.
*You allow a 20 day rotation, that is, the pasture will be ready to graze after 20 days rest, with just 15 days not uncommon.
*The pasture composition is 75% Barenbrug perennial ryegrass and 25% white clover.
*You will apply 60unit/ lbs. of supplemental nitrogen per acre in early spring, twice during summer, and once in early fall, for an annual total of at least 240 unit/ lbs.
*After 20 days rest, the pasture will yield 3000 lbs. of dry matter per acre at the 6" height, and will be grazed down to a residual of 1500 lbs., or to a height of 3", yielding approximately 1500 lbs. of DM/acre.

Therefore, using a 20 day rotation and an average DM yield of 1500 lbs./acre, with 800 acres you will utilize 40 acres per day, and have (40 x 1500=) 60,000 lbs. of DM per day to budget. Using figures from New Zealand's Lincoln University, a 500 lb. heifer needs 15 lbs. of DM/day to produce an average daily gain of 2.21 lbs.. Therefore, on your 800 acres with 60,000 lbs. of DM/day available, you should be able to feed 4,000, 500 lb. heifers and achieve a target gain of 2.21 lbs./day."

Recommend you start with 3,000 animals and work up as you gain the needed experience. Also, keep in mind that the stocking rate will decrease as animals gain. Move the animals daily to a new 40 acre paddock for best results. Clean drinking water and free choice minerals are a must in every paddock. Don't let the 800 acres intimidate you. The same numbers could be applied to 80

or just 8 acres. Most of us aren't blessed with the resources this farmer had. However, most land will be substantially more productive using MIG and improved species and varieties of grasses.

Nurse and Companion Crops

One frequently asked question is whether or not to use a nurse crop, such as oats planted in companion with the grasses. You have to realize that all plants require space and sunlight to prosper. Oats, for example, are far more aggressive in establishing than grasses, thus delaying the establishment of the permanent pasture. The grasses really don't get the opportunity to grow until after the oats are harvested. If your need is to establish permanent pasture, then don't use a nurse crop. If you have an economic reason to create a fast food source for your livestock, then a nurse crop can be justified.

Selecting Perennial Forages for Profit

Which Grass Should I Plant?

Many customers ask, "Which grass should I plant? I've read the brochures and am still confused. They all sound good. Please help." No forage fits all situations. The kind of livestock, the location and soils, type of management used, availability of irrigation, and winter and summer conditions all play a role in answering this apparently simple question. A dairy with mild winters in coastal Oregon , with irrigation and lots of liquid manure to fertilize the grass with, is a far cry from a cow-calf operator in Illinois , who can't irrigate and suffers cold winters with no snow cover. The same is true for the farmer in the South who prays for some new miracle grass to replace his stock poisoning KY-31 tall fescue.The grasses Barenbrug markets are wonderful but certainly not "wonder" grasses that take root and prosper everywhere. Some of them fit in a wide range of conditions and some only in very narrow, specialized situations. To help you decide the best forage for you, keep in mind that cool season grasses are categorized as either upland or lowland, meaning they thrive better under certain soil type, moisture, and fertility conditions. The upland cool season grasses prefer lighter, well drained upland soil and tolerate medium to low fertility and droughty conditions. These include the bromes and orchardgrasses. Orchardgrass is also best for shade tolerance. The lowland grasses perform best in heavier, moisture retaining and more fertile lowland soils. These include bluegrasses, tall fescues, perennial and annual ryegrasses, timothy, and reed canarygrass. In lowland pastures subject to flooding and standing water staying in excess of a few days, you are limited to using reed canarygrass or in less severe cases, tall fescue.

Following is an article written by John Thyssen the former Barenbrug Forage Manager who was born and raised on a Holland Dairy. It brings forth some excellent points and is well worth the read:

"The Total Farm Concept" A useful guide for selecting forage species

"Age old discussions of what species and varieties to plant in a pasture continue to occupy the

thoughts and comments of pasture farmers. And although these discussions are always very site specific we think we can hand out some useful tools to help you make the right decision.

Often, people believe that planting a pasture to a mixture of many grasses and legumes will result in something nice. It is thought that if you plant enough different species, some of them will work. This has resulted in many very complex mixtures with 15 or more components and as little as 2 or 3 percent of certain ingredients. ***However, if you plant all the grasses, and all the legumes in all the paddocks, you will end up with the ones that your management dictates****. An example is work done by Andre Voisin. He planted two pastures to white clover, orchardgrass, and perennial ryegrass. On one pasture he grazed it every 10 days. The other one he harvested as hay. After a few years, the heavy grazed pasture was mostly perennial ryegrass and white clover. The pasture that was allowed to grow and mature as hay was predominately orchardgrass. The management, soil type, fertility, drainage, and forage species planted will dictate what you end up with.*

Other thoughts are that you should not try to improve a pasture at all. "Whatever Mother Nature has provided is best". And although this might be true from a persistence perspective, it is rarely true from a production perspective. Experience has taught us that improving an old pasture can result in a pay back period of less than a year.

<u>Pasture Differentiation</u>

We look at a farm to supply needs for grazing livestock. We can divide this need into four categories: The need for high energy swards of forage, the need for drought and heat tolerance, the need for a place to graze in wet weather, and a need for harvesting forage for the winter months.

1. The need for ***high-energy paddocks*** *is for milk production with dairy cows, and for high rates of gain with stocker cattle, and lambs. These are the paddocks that will return the highest profit. These paddocks need to be on the best land that you have. This will allow you to maximize production at the lowest costs. The species of grasses that fit this land are perennial ryegrass, meadow fescue, and timothy. Add white clover and chicory and you have created a pasture that has high energy, high digestibility, and high yields, is dense, and palatable. If you have a dairy farm or are in the stocker business you need to have as many of these paddocks as you think you can. You manage these paddocks intensely, grazing very tight and often. That is the best management for these forages. They have similar growing rhythms and will persist together.*

2. Every farm also needs to have paddocks that are ***drought and heat tolerant****. The high-energy paddocks will suffer in the summer and so you will need to have ones that will tolerate the lack of moisture and heat. Tall Fescue is drought tolerant because it can send its roots deeper to reach moisture. Orchardgrass is heat tolerant. In a hot summer with enough rain, Orchardgrass will grow rapidly. In a summer with low rain and high temperature Tall Fescue will last longer. Alfalfa is a very drought tolerant high quality legume. On soils that are more subject to drought and heat, plant Alfalfa with Tall Fescue or Orchardgrass. In the Spring, when there is excess forage production you can harvest these grasses for hay or silage, there by allowing you to graze the high production type paddocks more often. In the summer when the*

high-energy paddocks slow down you can graze the drought tolerant paddocks.

3. Every farm is subject to a time when there is ***too much rain****. If you have a sandy farm it is not as big a problem, but if you have poorly drained soils it can be a big problem. Plant some paddocks that will create a dense sod. Bluegrass, Smooth brome, and Reed Canary grass will regenerate after being pugged, because they are rhizominous, quickly reforming the sod, whereas the high energy, and drought tolerant paddocks would be severely damaged. If you get dryer than normal weather, you can harvest these for hay and silage.*

4. The final group is a group of forages that are termed ***Annuals****. Forages like corn, sorghum-sudan, millets, or brassicas. These are designed to fill in holes of forage production thru out the year, add to the drought protection, or to harvest for winter feed. Some farms would not grow any of these, rather choosing to purchase any forage need that pasture does not provide. "*

Perennial Ryegrass

Perennial ryegrass is the most widely used forage grass in the world. It is adapted to the temperate areas of the world and recognized, except in the U.S.A., as the premier forage for pasture, hay, and silage. Because of its high digestibility and acceptance by livestock, ryegrass is unequaled. It makes the most milk, meat, or fiber.

Why isn't perennial ryegrass more popular in the U.S.A.? There are many reasons, and ignorance is certainly one of them. There are also many areas in the U.S.A. that are cursed with very cold, open winters like eastern Montana, North Dakota and Northern Wisconsin and Minnesota, or the humid, hot summers of the South and the south part of the midwest where perennial ryegrass just won't persist. Ryegrass requires moisture and high fertility. Generally it does well in temperate areas with good rainfall and in hot areas under irrigation with nights that cool off. Of all the perennial cool season grasses, ryegrass is the least winter hardy so survival can be risky in those areas with cold winters with no snow cover. We have learned a great deal about winter hardiness and some of the new Barenbrug varieties, especilaly Mara and Remington are proving to be much more winter hardy. These cold tolerant varieties are prime ingredients in Barenbrug's popular species mixtures along with of winter hardy orchardgrass, tall fescue and meadow fescue**. (Dairy Master, Beef Master)**

Ryegrass Management

Perennial ryegrass does require management. It is not a lazy man's grass. It is designed for production agriculture. To maximize, you have to stay on top of it. It grows very rapidly and the trick is to keep it vegetative, which means less than 10 inches in height for silage and hay and at 6 inches for grazing. At 10 inches it is 8 inches of leaf and 2 inches stem. Any taller just means longer stem, which is fibrous, waxy and hard to dry, and of little value. As a rule of thumb, start at 6 inches height when grazing, taking it down to a minimum of 3 inches residual. The old rule, "take half, leave half" applies as the grass needs a good residual so it can rapidly regrow back to the optimum nutritive value 6 inch height. For silage and hay, cut when the ryegrass is no taller than 1 foot.

Ryegrass is a vigorous starter, therefore very easy to plant. It seems to jump out of the ground, often germinating in 7 days, and ready to harvest eight weeks later. Ryegrass is extremely competitive and will make a place for itself. It takes just minimum tillage to establish. Also, it no-tills the best of all grasses. This feature allows easy introduction into other grasses. A good combination for hay and silage is a Barenbrug tall fescue base established first with perennial ryegrass introduced later using no-till. Use only low rates of ryegrass if ryegrass is seeded with other forage grasses due to the risk that it will out compete the other grasses. Five pounds along with 25-30 pounds of tall fescue is just right.

Diploid and Tetraploid

There are two genetic types of perennial ryegrass: diploids and tetraploids. Diploid is ryegrass as Mother Nature created it, whereas tetraploids are man made manipulations developed by the Dutch breeders. Each type has a specific purpose. Diploids are used mainly for permanent pastures. They tiller more, making very solid, durable, and long lasting pastures. They have higher dry matter content. The tetraploids were originally developed in Holland for use in short term pastures, called leys. These are often machine harvested for silage, green chop, or hay. Tetraploids have larger cells thus lower dry matter content making them lusher, somewhat sweeter, therefore a bit more palatable. On the negative side, tetraploids don't tiller as well, so the stands are more open than a diploid pasture. This factor, along with their having a higher crown, makes them less hardy under a grazing regime. Machine traffic can also inflict damage that has led to the greater use of diploid-tetraploid blends in an attempt to toughen the stand. Also, tetraploids do require higher fertility and moisture than diploids making them more susceptible to stress if these components are deficient. They are generally shorter lived. This lack of persistence is changing as the new, genetically improved varieties developed by Barenbrug have been selected for persistence, making them very suitable for pasture. The variety Remington is an example. On dairies, with finicky and high producing milk cows, the use of diploid/tetraploid blends is proving to boost production.

Maturity

Barenbrug's perennial ryegrass offerings are classified as early, intermediate, or late maturity, and by pasture or hay type, and whether diploid or tetraploid. Maturity denotes when the grass achieves 50% heading in the spring. Generally,the early varieties are 50% mature about mid-May, the late varieties by mid-June, and the intermediate types somewhere in the middle. Most New Zealand origin varieties are bred to be early maturing and winter active, as that country has short, mild winters like our coastal WA and OR. They want and need winter growth. European origin varieties cover the full maturity range, with the intermediate and late maturing the most popular. Farmers from northern, continental Europe prefer late varieties as they are the most fall dormant and winter hardy. The winters there come quickly, can be severe and are often followed by wet springs that do not allow early traffic on fields. This is similar to northern U.S.A..

Farmers in Ireland and Great Britain tend to use more intermediate varieties which mature earlier as they have milder winters and earlier springs, much like middle America.

Winter Hardiness

Winter hardiness is linked to fall dormancy and the country of origin, but not maturity. The level of dormancy *(think of dormancy as growth shutdown and going to sleep)* is bred into the plant by breeders in the country of origin based on the degree of hardiness needed for survival. A winter hardy variety stops growing and goes sound asleep in the autumn earlier than less hardy varieties, but continues photosynthesis that builds sugars which act as antifreeze in the plant cells. They will not awaken and grow again until spring, with the early maturity varieties being the first ones to awaken and commence growth. The lesser the degree of fall dormancy the lesser the winter hardiness, but the greater the winter production. The New Zealand origin varieties are the most winter active, with some varieties never going dormant. If they do go dormant they easily awaken and grow during a winter warm spell. If a cold snap follows then these varieties can winter kill. At the opposite end, Holland origin varieties are bred to be sound asleep during the winter which keeps them protected. Of course, continual snow cover further protects and enhances survival. For these reasons our Holland bred perennial ryegrasses are surviving the cold winters of New York, Michigan, and other northern areas.

Steps can be taken to enhance winter survival of ryegrass in the colder regions. Most important is to remove stock and cease grazing in the late fall, giving the grass a chance to grow about 2" beyond its residual height of 3", to about 5", before real cold weather arrives. This does two things. First it replenishes the root system giving the plant the strength to survive and regrow in the spring. Second, the 5" height is ideal for capturing snow and providing perfect insulation for the plant. Additionally, late fall nitrogen should not be applied as the result of accelerating growth can make the plant very vulnerable to winter kill. Good soil drainage is also important for winter survival. Standing water will drown out ryegrass or weaken it, making it more susceptible to cold, freezing weather killing it.

Mixtures of Varieties

This concept would be considered heresy a short time ago and probably will still be considered so by many dyed in the wool purists. We are now finding that combinations of different varieties of diploid perennial ryegrasses along with genetically modern tetraploids gives great strength to a pasture stand. Differences in maturity should be considered, pairing like maturities or pair early and intermediates or intermediates and lates in combination only. Using combinations increases the probability that one or more of the varieties will be growing at full strength at all times during the growing season. This combination of varieties appears to perform synergistically causing the sum of the whole to far exceed the combination of the individual parts. Of course some thought must be given to the ingredients, the main criteria being winter hardiness. Farmers in mild winter areas have the latitude to use the full range of New Zealand, British/Irish, and Holland origin grasses. Those in areas with cold winters should use the grasses bred in continental Europe. In recent years the benefit of combinations versus the traditional single variety planting has been evidenced. After three years as seen on one farm, the weakness of the single variety plantings had permitted the white clover to gain the upper hand. It encroached

from the desired level of 25% to an undesirable level of over 50%, while the strength of the combined variety pastures held the clover at bay at the 25% level. Also, results from an on-farm grazing trial put the combinations way ahead in production. *(Source: Edgar Smith, Beaver Meadows Farm, Comox, BC, Canada; a 300 cow grass based, grazing dairy.)*

Since introduction, Barenbrug's BG perennial ryegrass variety combinations (e.g.: BG-14, BG-23T, BG-34) all scientifically formulated have led to greater stand longevity and increased performance.

Suggested Barenbrug Perennial Ryegrass Varieties: D=Diploid, T=Tetraploid

D= BAR 1M, Mara , Barsprinter , Barnhem
T= Bargala, Remington, Barsaxo

Orchardgrass

A great deal is known about orchardgrass although its characteristics are changing rapidly. In northern areas of the United States orchardgrass is a fairly versatile plant. It prefers upland, well drained soils although it does well on fertile, lowland soils if they are not prone to excessive wetness. Orchardgrass can be very productive with yields of 7 tons DM per acre possible under intensive management. In some parts of the Northeast it is the preferred cut and carry and grazing grass. As we move south it becomes less popular because it tends to produce higher fiber levels and thus has lower quality.

The benefits of orchardgrass include: high yields, potential high quality, continued good growth during the summer slump (drought tolerant), and makes good use of manure applications. On the negative side it typically tends to head out early, is not as palatable as some other grasses, is sensitive to wet soils and flooding conditions, and has a tendency to form large clumps, especially the older varieties, and is very susceptible to rust.

New varieties developed by Barenbrug are now available which have overcome these negatives. Some are much later maturing making them especially valuable as a companion to alfalfa. These new improved varieties also have been bred for improved digestibility by reducing the indigestible lignin component of the plant fiber and for disease resistance. In grazing systems these features of improved digestibility and palatability are of great value.

Suggested Barenbrug Orchardgrass Varieties: Baridana, Intensiv, Barlemas

Tall Fescue

Most of us learned to hate tall fescue. We do admire its ability to survive and provide feed when everything else is brown on the non-irrigated farm. One outstanding feature has been the ability to provide standing hay, stockpiled feed of excellent quality for late fall and winter feeding. Plant breeders in Holland realized for years that tall fescue has a place. It is persistent, high yielding,

can tolerate a wide range of horrible conditions, including wet and flood prone ground, alkali and cold winters.

Older varieties of tall fescue, including KY-31 and Alta, grow wild in many areas. They have a course, rough leaf and grow into a heavy sod. Livestock will eat it if it is short and green, but would rather eat dirt when it gets tall. Barenbrug's breeders have bred modern genetic varieties with narrower, softer leaves which give exceptional yields, all without the horrible endophyte fungus found in KY-31 common in the Midwest and South. Farmers looking to plant tall fescue for livestock feed should buy endophyte free varieties as endophyte can cause health problems. The new Barenbrug fescues are truly wonderful. They are endophyte free and have the staying power and versatility of the fescue species but are much more readily eaten by livestock.

Tall fescue is a good choice for farms that want a grass that is persistent and will yield well even in droughty conditions. It is a good grass for the full range of soils. It will do well on a well drained sand and thrive on clays that are both excessively wet and excessively dry, depending on the season. Fescue is excellent for those who wish to get high yields and fill in low forage growth periods such as the summer or late fall and during winter through the use of stockpiling. Farms cutting for silage will find the new fescues are very high quality and will be very palatable when fermented in the silo. The new fescues will supply dairy quality feed even for the highest producing herds. One farmer in New York reports that his dairy cattle prefer fescue to other grasses and that their production dramatically increases when they graze fields containing it. Care must be taken to select genetically improved, endophyte free varieties as there are still many less palatable and less digestible varieties available.

Because the fescues are slower to establish, many farmers like to seed in the late summer or early fall at the rate of 35-40 lb./acre. There are upright hay/silage types of fescue and softer leaf types for grazing. Perennial ryegrass makes a valuable addition to a tall fescue stand. The ryegrass has exceptionally high quality and yields well during cooler periods with adequate moisture. The tall fescue will dominate during hotter, drier periods. Perennial ryegrass may best be no-till seeded in the fall into spring seeded fescue or the next spring if the fescue is fall sown. Another option is to add 5 - 6 pounds of ryegrass per acre to the initial tall fescue seeding. Use a tetraploid type perennial ryegrass for mechanically harvested systems and diploids for grazing systems. For best grazing results plant white clover with fescues. DAIRY MASTER, a tall fescue/meadow fescue mixture from Barenbrug has a perennial ryegrass component This mixture has proved very successful.

Suggested Barenbrug tall fescue varieties: Bariane, Barolex, BAR FA 6FRD

Timothy

Timothy has incorrectly fallen out of favor. It is still the grass of choice in the USA horse industry and is a very popular grazing pasture grass in Holland when combined with perennial ryegrass. Palatability and superior winter hardiness are its most important features. Sixty-five percent of forage grass mixtures in Holland include timothy. From Holland, Barenbrug now has improved varieties which are capable of being multiple grazed and can keep up with the fast ryegrass harvest cycle.

Timothy is a survivor. It does well on wet and heavy textured soils and is often used in cool, wet areas. This species establishes slowly and summer production is often low as it tends to go dormant in hot, dry periods. It is not a strong producer in the fall. Timothy does well in cutting systems but only a few of the new varieties, such as Barenbrug's **Barliza** and **Barfleo**, tolerate intensive grazing management. Timothy has been very successfully bred for late maturity and Barenbrug breeders are now working on improving early varieties. In the U.S.A. timothy is often planted with alfalfa. High yielding, late varieties such as **Barliza** can be used with intensively cut alfalfa; intensive cutting often kills North American bred varieties.

Timothy is also being used on dairy farms where high soil potassium (K) levels are creating excessive K levels in dry cow rations. Potassium levels can be kept down by selecting a field and not spreading manure or K fertilizer and then growing timothy as it absorbs less K than many other grasses.

Grasslands Matua Prairie Grass

Grasslands Matua Prairie Grass is an amazing forage. It's an excellent cropping grass for harvest by machine for hay and silage. It grows like oats, thick and tall, but is a perennial. It can also be grazed, but with care. It makes superior quality hay, especially beneficial for the horse market, and yields are very high too. The Oregon State University Research Station at Klamath Falls got a yield of 8.5 tons of dry matter per acre in their 1991 trials. In 1992 they obtained 10 tons! Forage tests commonly peg Matua at the 17-22% protein level with high TDN.

There are five cardinal rules for growing Matua:.

Rule #1: It is a nitrogen lover and needs a good application after each cutting to reach maximum potential, with about 300 units of N/acre total for the year at the minimum. This pays. Tests in New Zealand reveal Matua can uptake and utilize up to 800 units of N/acre/year. This is perfect for dairies, hog and chicken farms, and sewage treatment plants with excess nitrogen to use.

Rule #2: In humid southern areas, Matua should be planted only in the fall, the same time as annual ryegrass. Spring plantings don't give it enough root mass before the heat comes. It is also not competitive so should not be planted as part of a cool season type grass mix. For best results, fields should be sprayed to kill the previous grass. Plant alone as the only cool season grass. It can, however, exist in conjunction with a warm season grass such as bermuda or crab grass. Adding a clover, vetch or other legume, or forage chicory to the stand after it is established is acceptable.

Rule #3: Proper harvest is critical Cut at the boot or seed head stage, this is just before or when the seed head has emerged. Cutting earlier sets the growth back as the plant must regenerate a new growing point. Continual cutting abuse will kill the stand. Farmer feedback indicates that the seeding rate of 30 lbs. of seed per acre is the bare minimum, with 40-50 lbs. being better, especially in the spring when weeds are rampant. Use an herbicide to control serious weed infestations.

Rule #4: Matua, atypical of a cool season forage grass, is an indeterminate heading plant that produces seed constantly throughout the growing year. We can use this special gift to our advantage. If a stand thins for any reason, letting a crop reach the mature seed stage then drop seed will thicken and revive the stand. Regardless of stand condition, it is good life insurance to let it seed out every year, with the seed drop timed for late fall. This way the seeds will sit in the ground and not germinate until next spring. By doing this, a stand will be preserved even if winter zaps the mother plants. A farmer in Alaska has used this method with good success.

Rule #5: Matua is also a very strong winter grower which can make it vulnerable to winter kill if you get a Chinook or warm spell, followed by a cold snap. Contrary to other times of the year, keep it grazed short during the winter or cut it to a 4" stubble to enhance winter survival. Do not attempt to stockpile as tall Matua under snow lodges-over and smothers which kills the stand!

Those who have mastered the rules love Matua with a special passion. It is a specialized grass requiring careful management. Most failures are farmer caused. Unfortunately, Matua has been hyped by some sales people as a **wonder** grass, which no grass is. Start small and learn the management before planting Matua on the whole farm.

Matua is being grown in the Amarillo, Texas and Clovis, New Mexico areas under irrigation and being grazed by beef cows. Matua is performing well there considering the abuses of under watering, under fertilization, and the 100+ degree F heat. It thrives best in situations of good moisture and high nitrogen fertilization but we now know that Matua can also provide good feed in some adverse conditions. The poorest stand observed was still producing 1000 lbs. of gain per acre! The farmer was more than satisfied. A dry land farmer in Kansas reported that Matua provided more feed in the summer than his other grasses. This proves that Matua can be a star performer under many varied conditions. Once again, there are five cardinal rules. If you follow them, you will most likely enjoy success. Break them and you will fail!

Barenbrug Matua is de-awned for free flow seeding and is fungicide treated to prevent smut.

The White Clovers

The role of white clover is often misunderstood. Clover is a highly desirable pasture ingredient but must be in proper balance with the grass component, with 25-30% clover and 70-75% grass ideal. Clover adds greatly to the overall value of the pasture serving both as a highly nutritious feed for our animals and, being a legume, supplying nitrogen to the soil. White clover can capture and release up to 150 lbs./acre/year of nitrogen just from the atmosphere alone through a symbiotic relationship with rhizobium bacteria that colonize the roots of the clover. Regarding this, there is some misunderstanding. Clover doesn't fix nitrogen for the grass. The bacteria fix nitrogen for themselves but the clover has access to much of it. Much of the nitrogen released from the clover into the soil results from the death of clover roots, decayed leaves, and whole plants as well, and the recycling of N when cattle urinate after eating nitrogen rich clovers. Clovers love phosphate, so be sure to keep the levels up.

Clovers are opportunistic. If there is a vacant space, they will fill it. If the grass in the stand declines for any reason, be it winter kill, summer drought, variety weakness, or whatever, the clover will usually compensate. We do not really want this as whenever the clover density increases beyond the manageable 25 - 30% we are asking for bloat problems as well as possible metabolic problems associated with high nitrogen feed. In New Zealand this may not be a problem as they have the products to minimize bloat. We don't. Losing three or four cows is no laughing matter.

White clover seed is extremely small, numbering 1,400,000 seeds per kilogram or about 635,000 seeds per pound. The seed is also very tough. It will sit in the soil for long periods of time just waiting for the opportune time to sprout. An example, some farmers plant clover by the cow-pie method. They mix clover in the feed. It is so tough that it passes right through the animal. Also, because of its tiny size, most farmers can't choke their seed drills down small enough to plant clover at 2-3 lb./acre maximum seeding rate. Consequently clover often goes on the field at a rate way above safe levels.

There are two reasonably accurate ways to plant clover. One is to use the Aitchison SeedMatic™ drill which can seed at these low rates with its famous sponge feed mechanism. Most people won't buy a new drill and there is a much quicker way to seed white clover. An electric seeder can be attached to an ATV or pickup tailgate. There are several models available but I prefer the Herd ATV seeder which holds up to 75 lbs. of clover seed.(www.herdseeder.com) Broadcasting seed with the electric seeder allows you to go into an existing stand or a recently seeded stand. It is not advisable to mix clover in with other seed as it will settle to the bottom of the seed hopper and seed heavy in the first areas that are planted and too light on the last. In northern areas the seed can be frost seeded. Late winter is also a good time in southern areas although frost action may not be as helpful. To increase the percentage of seed establishing, more southern farmers may wish to consider dragging their fields before and after broadcasting with a chain harrow. This gets some of the seed covered by soil. It is best to inoculate white clover. Use type B or type AB, the correct types for white clover. Most Barenbrug clovers are pre-innoculated. Ask for them.

Barenbrug has several varieties which are market leaders. **Alice** is a large leaf, long living perenial far superior to the shorter lived ladino types. Alice is perfect for the north and the west, whereas the new heat tolerant **Barblanca** is the ideal choice for the transition zone and southern USA.

Alfalfa

What can be said regarding alfalfa? There is a great deal known about the management and feeding of alfalfa as it is one of the most researched crops available in the United States. We will leave most of the questions regarding growing and feeding of alfalfa to the Land Grant Universities, Extension Services, and local advisors. Barenbrug carries a full line of high quality and disease resistant alfalfas suited to most of the traditional alfalfa growing areas in North America. The questions we receive often involve the potential for grazing alfalfa. Let's discuss the topic.

Grazing alfalfa requires a high level of management both for the health of the alfalfa and the livestock grazing it. Alfalfa can cause bloat so care needs to be taken to avoid this. We will focus here on the management of the alfalfa and refer you to a livestock advisor or veterinarian regarding the management of bloat.

On the one hand, grazing alfalfa would not be recommended as it can dramatically decrease the life of the alfalfa stand. Why do we insist on grazing it? It has the highest yield and quality potential of any perennial crop we can grow. Simple as that. During periods of drought, when all the grasses have quit growing, alfalfa will likely still be growing and producing a quality feed. The incentive to grow alfalfa is high. Alfalfa should be grown with a grass when used as a grazing crop. This helps reduce the potential of livestock bloating and helps create a sod which livestock will be less likely to punch up. The alfalfa will also be less prone to heaving due to freezing and thawing in cold winter areas. It would generally be recommended that the alfalfa be utilized for both cut and carry harvest as well as for grazing. The first cutting in the spring would be targeted for mechanical harvesting, summer harvests may be grazed, and a fall harvest might again be mechanically harvested. This helps reduce the grazing stress on the alfalfa. If alfalfa is grazed all season it will likely deteriorate if defoliated more frequently than every 30 days which does not allow root reserves to be adequately replenished. Eventually the plant can be worn down and become susceptible to diseases and winter kill. In all cases it is wise to have at least one cutting, preferably later in the season, with a 6 week cutting interval to allow the plants to store adequate root reserves.

Some companies have been breeding “grazing type” alfalfas with creeping or branching root systems. These alfalfas probably do have improved abilities to stand up to grazing. Their draw back can be dramatic loss of yield. Producers following our recommendations of harvesting the first and last cuttings of the season mechanically may wish to choose Barenbrug’s traditional rooting type of alfalfas. Our varieties are ranked among the highest yielding of all alfalfas and are bred for greater persistence. They should stand up to grazing better than many traditional types and have the excellent disease resistance profiles we have come to expect. We believe farmers will appreciate the high yields and still get satisfactory persistence. Regardless, farmers grazing alfalfa should view the alfalfa as a short-lived perennial. The better the soils and the better the alfalfa, the longer lived the stand is likely to be. Always include sufficient grass in the stand so the grass can tiller out and thicken the stand as the alfalfa thins.

How should I seed my alfalfa? A common question. Speak with your local Extension Agent or crop advisor regarding local experience. By far the most successful method is a traditional full tillage seeding. Alfalfa has proven to be a challenge to no-till seeding and even more difficult to frost seed. Of course, there are always exceptions. No-till seeding into an existing sod is not likely to work unless the sod is completely killed using herbicides. If the sod contained alfalfa, at least two weeks should elapse following spraying to reduce the risk of auto toxicity, caused by the release of chemicals into the soil by the existing plants. These chemicals inhibit the growth of new alfalfa seedlings. Thickening a stand of alfalfa is even more of a challenge, partially due to auto toxicity.

While growing alfalfa for grazing will meet with some skepticism, it is worth consideration for farmers with suitable land resources. Research at the USDA Pasture Lab at Penn State found that alfalfa and cold hardy perennial ryegrass (Holland cultivars) could last 6 to 8 years. Rest periods between grazings of less than 35 days favored the ryegrass while longer periods favored the alfalfa.

Chicory

Chicory is an ancient, wonderful perennial forage vegetable devolped in France and New Zealand which gives excellent summer production and very high feed value. Its deep tap root makes it very drought tolerant. It looks like a giant dandelion, but leafier. Feedback from a farmer in Michigan told us that his chicory provided feed for his sheep during a summer drought when all else was brown. Chicory is fantastic for fattening lambs and steers. It is excellent feed for all classes of livestock, ratites, and wildlife. Chicory can be a very valuable addition to most farms if managed properly.

The first forage chicory, New Zealand's **Grasslands Puna chicory**, was introduced to the USA in 1990. Since then thousands of pounds of Puna chicory have been sold. It has become the standard. A new variety is now available through Barenbrug. It is **Forage Feast Chicory** from France and is known for its profuse leaves and bolt resistance. Forage Feast would be the choice for ideal conditions of fertility and moisture, while Puna would fare better under less ideal conditions.

Chicory should be planted in the spring in all areas except the hot South where fall planting is best. It should be planted, not broadcast like clover, for maximum take. It can be frost seeded in the cold winter areas but we don't believe this is cost effective considering the high cost of seed. Drilling at 1/4 to 3/8 inch depth on a 6 or 7 inch width drill band is ideal as the mature plants need space. No-till planting also works especially well if preceded by an herbicide to kill or burn back the existing sod. Broadcast seeding, followed by harrowing and cultipacking is effective if the seed is uniformly broadcast. Seed 4 lb/acre. Keep in mind that chicory is a root vegetable (some older plants have roots sugar beet sized) and needs at least 80-90 days after planting to develop its life sustaining root before being subjected to having its leaves harvested. If you violate this rule you may lose your new plants.

With few exceptions, the best method of using chicory in a livestock grazing application is to establish it as a monoculture, planted in a solid block or strip. On dairies, a paddock close to the milk parlor where the cows can be given a daily two hour ration in the morning and then walk to a higher fiber grass diet is ideal. An alternative, applicable for all livestock, is to plant a strip along the edge of a field and across multiple paddocks. This allows the livestock to graze chicory in each paddock. Planting a monoculture greatly simplifies management. It can be fertilized separately and mowed separately. When chicory puts up a seed head (bolts), as it will, the cows refuse to eat these stalky shoots. They must be mowed to make the plant vegetative again. If the chicory is broadcast throughout the field, the whole field in this case would need mowing which would waste the grass crop. In a hay or silage system, chicory can be included as part of the planting mix at 1 to 1.5 lbs. per acre as the crop is totally harvested at regular intervals.

Selecting Annual Forages for Profit

Annual forages can serve an important role in a forage program. Quite often they fill a need; this might be increased summer, fall, or winter feed production. Annuals are often used because there is a gap in the crop rotation or as a temporary crop while waiting for lime to adequately adjust the pH before a more permanent forage is sown. Winter annuals, such as rye grain, won't be discussed here.

Annual Ryegrasses

The traditional annual ryegrass growing area of the U.S.A is the Southeast. Southeast farmers have largely used annual ryegrass as an annual forage for over-wintering livestock. Annual ryegrass is greatly overlooked in other areas as a method to rapidly produce high yielding, high quality feed. It may be grazed or cut for silage. Producing dry hay is difficult due to high moisture content. Annual ryegrass, in southern areas, is capable of producing feed for a period of 200 days.

There are two primary types of annual ryegrass, Italian and Westerwold. The Westerwolds are true annuals that will produce a large amount of feed in one season and then die. Italian types, either diploid or tetraploid, will express biennial behavior if weather allows them to survive from one year to the next. Westerwolds are often used when a lot of feed is needed in a short period of time. They will head out so intensive management is required to maintain feed quality. The Italian types will not tend to head out if they are spring seeded after the risk of frost. This offers an advantage when top feed quality is needed. The Italian ryegrasses may also over-winter and produce good early season production even in northern areas. European bred Italian varieties, **Bardelta** and **Barmultra,** are recommended for cold winter areas. **Green Spirit**, a diploid/tetraploid Italian mix is proving extremely popular. It has proved to be highly beneficial when used to "thicken" existing perennial pastures, to include alfalfa stands, by annual overseed of 15-20 lbs/acre.

Annual ryegrass has traditionally been seeded at rates of 15 - 20 lbs. per acre. Seeding rates of 35 - 40 lbs. per acre are much more productive for intensive management and grazing. Like perennial ryegrass, annual ryegrass likes moisture and relatively cool weather to produce high yields. The Italian tetraploid varieties respond very well to high levels of nitrogen when used as a weapon of combatting high levels of soil nitrogen accumulation, such as can exist in corn plantings, where they have has been shown to continue to increase in yield even when exposed to more than 300 lbs. per acre of nitrogen. Local Cooperative Extension or consultant recommendations should be followed to avoid nitrogen losses or excess nitrate levels in the plant. For valuable information on planting in corn to reduce nitrogen accumulation (Relay Cropping) visit: http://www.farmwest.com/index.cfm?method=library.showBook&librarybookid=13

In rapid growth periods, annual ryegrass may be harvested or grazed 6 weeks after planting. In slower growth periods it may be 2 months before the first harvest. As with most grasses, annual ryegrass allowed to get tall loses feed quality. Due to its aggressive growth pattern, annual ryegrass may be allowed to reach 8 - 10 inches in height before harvesting. However, it will

rapidly reach one foot in height and rapidly start losing feed value. The rapid growth habit often requires very close management.

Suggested Barenbrug Italian Annual Varieties:

D= Bardelta
T= Barextra, Barmultra
D/T blend "Green Spirit"

Brassicas

Common in Europe, Great Britain and New Zealand, brassicas are being rediscovered in the United States as supplemental summer, fall, and winter feeds. The brassicas work well as a break crop between an old stand and a new seeding. Brassicas provide higher crude protein and digestibility at half the cost of hay or conserved forages. Cold, drought, and heat tolerant, these crops provide valuable feed when other crops are less productive. Because these crops have outstanding frost resistance, northern producers can get much closer to year round grazing. In the south, Brassicas provide feed during the typical summer feed deficit. Why the brassicas aren't more common in North America is a mystery. They are a logical next step for farms looking to balance and lengthen their grazing season. The Brassica species used in farming are: rape, turnips, kale, fodder radish, and a new disease resistant rape hybrid from New Zealand named **T-Raptor**.

Rape, turnips and **T-Raptor** can be spring or summer planted for summer or fall grazing. Seeding rates (lbs. per acre): are 3 lbs/ac for a precision drilling making them very economical to produce. For a broadcast seeding, a rate of 4-5 lbs/ac is recommended.

Precision drilling of the seed is preferred, however successful stands can be established by broadcasting, even from aircraft. It is ideal to plant these crops into the stubble of a harvested small grain. The old root systems continue to wick moisture up from deeper in the soil. They can also be planted in a conventionally prepared seedbed or a killed or suppressed sod. The animal "hoof" planting methods works well.

Rape is generally ready for grazing 75 -85 days after planting, turnips take 60 - 90 days, and **T-Raptor** 50-70 days. All have the potential of regrowth and multiple grazing harvest if managed by strip grazing. If cattle are turned into a large area and given free choice feeding a great deal of wastage will result from trampling. These are high quality, low fiber crops. Livestock should have restricted access and receive supplemental roughage prior to grazing brassicas. A diet of 80% forage brassicas is optimum.

As the soil often gets heavily pugged by the livestock during late fall and early winter grazing, broadcasting annual ryegrass over the area just before the livestock are turned in may be a worthwhile endeavor. The hoof action punches the seed in. Early in the spring a new crop of ryegrass should emerge without the need for more tillage and the expense associated with seeding. Personal and local experience will help fine tune this method.

Brassicas require good management and are worth the effort as they can produce 40 tons or more per acre (wet) of high quality feed at times of the year when forage is short. In choosing the best brassica for a given situation it is best to look at the individual product descriptions and the crop comparison charts.

A staggered planting of T-Raptor seeded first, followed 2-3 weeks later with rape, then lastly turnips 2-3 weeks later can provide bountiful feed for the summer or, if planted later, from autumn to winter.

Recommended Barenbrug Forage Brassicas:

Forage Turnip

Barkant is a very vigorous diploid turnip with a large purple tankard root. (50% of the root is above the ground). Barkant has high leaf and bulb yield. Barkant has high sugar content, which provides winter hardiness and increased palatability. Barkant has good tolerance to bolting. Using a controlled grazing management system, Barkant can provide multiple harvests, first of the green tops followed last by the root, commonly yielding a total harvest of 4-6 tons/acre of dry matter. Barkant is suitable for stockpiling, strip grazing with sheep and cattle.

Barabas is a tetraploid turnip variety with high fresh matter yields. It provides quick bulb development after sowing. It has more leaf yield than bulb yield. Barabas also has good frost tolerance. Barabas is later in maturity than Barkant and has good resistance to bolting. It holds bulb quality longer than Barkant. Barabas has high digestibility (88-91%). It is good for mixtures with Barkant for strip grazing and stockpiling.

Forage Rape

Forage rape is suitable for either grazing by livestock or green chop feeding. It has high energy and high digestible crude protein content (up to 30% in leaves). Forage rape has good night frost tolerance and rapid initial growth. Rape takes 75-85 days from seeding to being ready for harvest. All the rape varieties listed here are suited for multiple grazing. Forage rapes are highly suited for production to supplement perennial cool season pastures in August and September after they are planted in May or early June.

Barnapoli is a medium tall forage rape variety that produces very high yields, high protein levels, high protein levels and high digestibility. Barnapoli ranked #1 in a

sheep grazing study in Ohio, outperforming all other varieties of any Brassica species. A combination of Barkant turnip and Barnapoli rape seeded together has proven highly successful.

T-Raptor is an early maturity hybrid forage rape variety with 50-70 day crop duration. It is a leafy forage (higher leaf to bulb ratio) highly suited for summer feeding. It is good supplement for the periods when cool season forage grasses slow down in production. It can be sown in summer or early spring. Under ideal management it can be multiple grazed at monthly interval. Highly disease resistant.

LINK and Technical Assistance

Please refer to the http://www.barusa.com web site and view the forage section to get full details and data on all Barenbrug forages. Please call me, John Kaye, at 800-972-1812 or FAX at 360-933-0202 and I'll be happy to provide technical assistance on what to plant and information on where you can purchase Barenbrug seed products.

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