# Advantages and Disadvantages of Homegrown Forages

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## Summary

The environment in which dairy farmers have to produce milk is changing. Feed prices have shifted upward in the past 5 years, while milk prices remain volatile. Land prices are increasing along with land rental rates. Dairy farm managers should periodically review their feed procurement strategies. What feeds should be grown? Which should be purchased? Which of these activities will provide the greatest return? Of the crops grown on the farm, forages continue to provide the greatest return to farmers; however, individual farm costs can vary widely. Ohio corn silage yields on 18 farms ranged from 10 to 31 tons and ranged in cost from $21.66 to $56.33/ton.

Three alfalfa cutting management strategies are evaluated using historical alfalfa hay values (SESAME™ January 2005 to March 2012) corrected for milk production potential. The 3-cut systems show an advantage in gross returns per acre less harvest costs in almost every year and situation, unless excellent management is able to produce at least some premium (36% NDF) hay in a 4-cut system.

## Introduction

Cropland represents the one of the largest capital investments for many Ohio dairy farms. According to the USDA National Agriculture Statistical Survey (2011), average farmland values in Ohio have more than doubled to $4,400/acre since 1999. In the past year alone, land prices have increased by 8.6%. In some agricultural areas, competition with non-agricultural uses has pushed farmland prices to over $10,000/acre for individual parcels. In addition to owned land, many farmers control land resources through rental arrangements with non-farming landowners. Rental rates have increased in tandem with land prices. While the USDA National Agricultural Statistics Service (**NASS**; 2011) reported that Ohio's 2011 average rental rate for farmland was $89/acre, ranging from $23.50 to $159/acre in Noble and Darke Counties, respectively; in many agricultural communities, land has been leased for $200/acre or more due to high crop prices and fierce competition for limited land resources.

The high crop prices that have been a contributing factor in increasing land prices have obviously caused feed prices to increase for dairy cattle. In the last 10 years, corn prices, which tend to drive the price of all other dairy feeds, have dramatically increased. The average corn price reported for Ohio by **NASS** for the 5 year period from 2007 to 2011 of $4.54/bu was up 91% from the previous 5 year average of $2.38/bu for 2002 through 2006, reaching an unprecedented high of $6.43/bu (annual average) in 2011.

Since the early 1990s, the cost and price structure of crop production has favored Ohio dairy producers focusing their land, management, and

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other resources on quality forage production. With changing grain and feed prices, cropping patterns, and land costs, it is worth reviewing this focus to determine if it is still the best strategy for Ohio's midwest dairy farms.

**Investment in Land**

Dairy farms typically want to control land not only to grow crops but to have adequate land close to their production unit for spreading dairy manure nutrients when needed. While these nutrients have a definite fertilizer value, there is still not a ready cash market for these nutrients in mot of the midwest, so the best way to capitalize on their value on an individual farm basis is to utilize them to grow feed for the dairy enterprise. Land purchases can be planned only to a limited extent. Since land is infrequently available for purchase or rent during the lifetime of a business and usually at the desired timing of the seller, farm managers must carefully analyze all land purchases, particularly in areas of extremely high land prices and when purchases must be debt-financed. While the land can offer many advantages to the operation, particularly for nutrient utilization and feed production, if the purchase is to be made by the dairy farm and this purchase puts the dairy farm at serious financial risk, its' purchase is not a wise business decision. The total debt level of the farm should neither exceed 40% of assets nor should the farm's total debt per cow exceed $3,500 if the cows are expected to service the land debt.

Land becoming available for rent in the near future may carry a hefty per-acre rental rate. Is $200/acre or more a reasonable rental rate for a dairy farmer to pay for crop land? While there is no blanket answer, some factors that should be considered include: the dairy's need for access to the land, quality of the land, availability of other land at a more reasonable rate, opportunity to re-negotiate a lower rental rate in the future, and total cost of rental land to the dairy. In other words, if other acres are leased at lower per acre rates, then it may still be profitable for the dairy to rent the more costly, quality land because the total rental costs will still be manageable. All decisions have to be considered in terms of the short- and long-term management needs and profitability of the dairy farm business.

**Management of the Crop and Forage Enterprise**

Who is managing or will manage the crop and forage enterprise for the dairy operation? Is the farm large enough to support a person or part of a person dedicated to crop production and management, or will it take management time away from the cows, heifers, or calves? Does the person have the skills to manage to produce the quality and quantity of forages that the dairy determines it wants and needs? Are consultant services available to assist in some areas, such as soil fertility, seed selection, and integrated pest management? If these questions cannot be answered positively, will it/does it cost the farm more to grow forages poorly than it would to purchase good quality forages?

Purchasing rather than growing forages still means that someone will have to manage the forage procurement enterprise, which is not necessarily simple if done well. To do this well, the manager should know exactly what forages are needed for each animal group in what quality and quantity, manage their procurement, storage, distribution, and associated cash flow requirements. This is nearly the same information the farm has to know if they are growing their forages.

**Ability to Grow Forages Profitably**

The ability to grow forages profitably varies from farm to farm as does the ability to produce milk profitably. Of 24 Ohio dairy farms participating in the 2010 Ohio Dairy Farm Benchmarking Program, 18 farms grew corn silage on owned land.

While all but one farm reported a positive return, yields ranged from slightly more than 10 to 31 tons/acre, averaging 21 tons/acre for the 18 farms. Total costs including labor and management averaged $34.88/ton, ranging from $21.66 to $56.33/ton. Even with the current high corn grain prices and conservative hay prices, the 2012 OSU Extension Production Budgets (Ward, 2012; Ward and Shoemaker, 2012; Ward et al., 2012ab) show that alfalfa haylage and hay production continue to generate the highest returns per acre over both variable and total costs followed by corn grain, corn silage, and soybeans (Table 1). As recently as 2006 (Ward, 2006), 160 bu per acre corn yielded a negative return to total costs at $2.50/bu, which made sale of the crop as silage to a dairy farmer potentially attractive if harvest costs could be avoided or other favorable agreements reached. At current grain market prices, it may be more difficult to attract acres away from corn grain production into contract silage production, especially when grain producers have contracted their production for grain sales. This situation can increase the need for homegrown forage production.

**Investment in Equipment or Custom Hire**

An important advantage of a farm's growing their own forages is the control they have over harvest – harvesting when they want to harvest and accomplishing harvest quickly and efficiently, minimizing potential weather or pest damage to the crop and maximizing some desired combination of yield and quality. To do this effectively, the farm must own or have control of the proper equipment when it is needed. Ownership requires additional capital investment which must be done carefully, balancing the need for efficiency with investment in assets that may be used less than 15% of the time. Pricing on a new 250 horsepower self-propelled chopper with a corn head and hay pick-up head can begin at $270,000, with forage wagons running an additional $24,000 each. If this cost is not spread over at least 1,500 acres of forages, the dairy may have difficulty cash-flowing the compliment of harvest equipment. Another option is to consider hiring a custom harvester for all or part of the dairy's forage production. The feasibility of this option may vary by region and availability of good, reliable custom operators. Working with a custom operator allows the dairy to take advantage of harvesting equipment and options, such as: 1) larger units that can harvest more quickly and efficiently, and 2) choppers that can process silages and apply treatments that older, on-farm equipment may not be equipped to do. The dairy also does not have to employ a person that can maintain and run harvest equipment. The disadvantage is that in years of challenging weather, getting a custom operator at the farm at the optimum time for quality forage may be challenging.

The availability of good custom forage harvesters has increased in Ohio in the past 20 years. The Ohio State University conducts and publishes a survey of Ohio Farm Custom Rates every 2 years which includes forage production field operations (http://ohioline.osu.edu/ae-fact/pdf/AEDE-11-10.pdf). In addition to the harvest costs available in the crop production budgets (Table 1), these custom rates provide useful information when working with a custom harvester to develop a contract price. The budgets and custom rate references also provide links to references on machinery operation costs published by multiple universities.

**Quality of Forage**

One advantage of homegrown forages is that, good or bad, the dairy knows exactly what was harvested - what the forage looked like standing in the field, what happened to it during harvest, and how it was stored. The associated disadvantage is that – if it was bad- the farm has it. If it was kept separate, and it can be fed to an appropriate animal group (if there is one), or sold and replaced with better feed, or used for bedding or compost, the

negative impact can be minimized. If none of that happens, the farm is at a disadvantage assuming that a good, consistent supply of forages could have been purchased.

In the current crop price environment, is growing high quality forages the best use of high priced land? With the current price of nutrients (energy being priced higher and protein lower than historically "normal"), and if we are growing alfalfa, should we manage for more yield and less quality? Undersander and others (2004; 2008) indicate that 3 cuttings taken at 10% bloom will increase yield by about 15 to 20% more than 4 cuttings taken at the bud stage. However, harvesting at the later stage will result in a higher neutral detergent fiber **(NDF)** and lower crude protein **(CP)** content in the harvested forage which will impact potential milk production. Weiss and St-Pierre developed a method to adjust hay values to credit -or debit- them for their potential milk yield. These are the "corrected" values generated by the Sesame™ software program in Table 2 for 3 qualities of hay using historic nutrient values for January 2005 through March 2012.

To evaluate the impact of managing for yield vs quality, we will use the average yield of the 11 alfalfa varieties harvested at the Wooster test plot in 2011 of 5.84 tons/acre of dry matter **(DM)** in 4 cuttings as the yield for a 4 cutting system. Two 3-cut systems will also be evaluated, one at 115% of the 4-cut yield, or 6.7 tons/acre of DM, and one at 120% of the 4 cut yield, or 7 tons/acre of DM. Because the 3 cuttings are harvested at a later stage to capture more potential yield, all 3-cutting system hay was assumed to be 44% NDF, 18% CP alfalfa hay and valued accordingly. Harvest costs were generated using the 2012 OSU Alfalfa Haylage Production Budget with fuel price adjustments made for each year in the analysis.

While we would like to make 100% of the 4-cutting hay at the optimum time, even in a well-managed system, some weather will interfere with a cutting, so some will be harvested perfectly, and some will be harvested at a more mature stage or may receive some weather damage. Figure 1 shows the gross returns per acre less harvest costs for the three cutting systems when 60% of the alfalfa harvested from the 4 cut system is good (40 NDF) quality, and 40% is fair (44 NDF) quality. In every year, both 3-cutting systems generated greater returns over harvest costs than the 4 cutting system. The 115% 3-cut system averaged $50/year, and the 120% 3-cut system averaged $95/year more in gross returns less harvest costs per acre than the 4-cut system, even though 60% of the 4-cut yield was higher quality and therefore of higher value.

Even if we assume a situation where less of the 4-cutting system is harvested as fair quality (25%), there were only 2 of the past 8 years (2005 and 2007) when the 4-cutting system had an advantage over one of the 3-cut systems (Figure 2). Even with 75% of the 4-cut system harvested and valued as good (40% NDF) quality haylage, for the last 5 years, the 115% 3-cut system averaged $51/year and the 120% 3-cut system averaged $80/year more in gross returns less harvest costs per acre than the 4-cut system.

If all of the 4-cut haylage is harvested as good (40% NDF) quality (Figure 3), then there are a few years when the 4 cut system has had a slight advantage over the 115% 3-cut system. There were also 2 years (2005 and 2007) when the 4-cut system had a $9 and $24/acre respectively, advantage over the 120% 3-cut system. However, in the last 5 years, the 120% 3-cut system has averaged $52/acre/year more in gross returns than the 4-cut system, and the 4-cut and 115% 3-cut systems were essentially the same.

Only if the 4-cut haylage is harvested as a mix of good and premium (36% NDF) quality (Figure 4) does the 4-cut system begin to show some advantage over the 3 cuttings with higher yields

harvested at 44% NDF. When 40% of the 4-cut system was harvested as 36% NDF haylage, the 4-cut system consistently generated the highest returns over harvest costs per acre. The advantage over the 115% 3-cut system averaged $91/acre over the 8 years and $84/acre over the last 5 years. The advantage over the 120% 3-cut system was $45/acre over harvest costs since 2005 and $30/acre over the last 5 years.

**Implications**

1. Investments in land and machinery, especially high-priced land and machinery, must be carefully evaluated to ensure that they enhance the profitability of the dairy farm business and do not jeopardize the solvency of the business.

2. Land rental rates should be carefully evaluated in the context of total costs.

3. Forages (alfalfa haylage, alfalfa hay, and corn silage) continue to generate the greatest returns over variable costs per acre. Alfalfa haylage generates the greatest returns over total costs per acre according to OSU budgets. Individual farm costs will vary widely. Farms should complete enterprise analyses to fully understand and manage their costs of producing forages.

4. Review alfalfa cutting management and quality. A review of 3 alfalfa cutting systems showed that under normal harvest conditions, a 3-cutting system harvesting 15 to 20% more DM of fair quality (44% NDF) alfalfa hay or haylage nearly always generated more gross returns over harvest costs per acre than a 4-cutting system with some higher quality but lesser yields, even when adjusted for potential milk production. Another advantage is the potentially longer stand life for the 3-cut system.

5. Excellent alfalfa mangers who can harvest some premium (36% NDF) alfalfa haylage as part of a 4-cut system will benefit from a 4-cut over a 3-cut system.

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**Table 1.** Return above variable and total costs per acre of production, 2012 Ohio State University Extension Crop Production Budgets[1].

| | Soybeans | Corn | Corn Silage | Alfalfa Hay | Alfalfa Haylage |
|---|---|---|---|---|---|
| Yield/acre | 48 bu | 155 bu | 21 ton | 6 ton | 12 ton |
| Price/unit | $11.40/bu | $5.50/bu | $47.75/ ton | 3.6 T @$180<br>2.4 T @$140 | 8.4 T @ $89<br>3.6 T @ $70 |
| Return over variable costs | $340 | $462 | $526 | $703 | $719 |
| Return over Total costs | $50 | $121 | $56 | $374 | $406 |

[1]Budgets can be found online at http://aede.osu.edu.programs/farmmanagement/budgets

**Table 2.** Annual average value of 36, 40, and 44% NDF alfalfa hay in dollars per ton on a DM basis. Based on nutrient values and corrected for potential milk yield calculated using the Sesame™ software program[1], January 2005 through March 2012.

| | | Hay Quality[3] | | |
|---|---|---|---|---|
| | Milk Price[2] $/cwt | 36% NDF 22% CP 170 RFV | 40% NDF 20% CP 150 RFV | 44% NDF 18% CP 130 RFV |
| 2012[4] | 16.74 | $250.09 | $210.37 | $181.01 |
| 2011 | 18.61 | $286.18 | $243.21 | $208.38 |
| 2010 | 14.61 | $219.13 | $190.52 | $163.58 |
| 2009 | 11.50 | $210.03 | $182.58 | $156.30 |
| 2008 | 17.62 | $269.75 | $232.87 | $201.78 |
| 2007 | 18.22 | $191.20 | $154.51 | $123.63 |
| 2006 | 12.03 | $144.55 | $122.17 | $102.65 |
| 2005 | 14.23 | $145.52 | $120.13 | $ 97.16 |
| SD | 3.14 | $ 56.07 | $ 49.59 | $ 45.64 |
| Min | 9.43 | $132.69 | $108.70 | $ 85.66 |
| Max | 21.94 | $352.26 | $309.85 | $277.59 |

[1]Data provided by Normand St-Pierre, March 19, 2012.
[2]Approximately 3.6% butterfat price used to calculate corrected forage values.
[3]NDF = Neutral detergent fiber, CP = crude protein, and RFV = relative feed value.
[4]Includes January and February 2012.

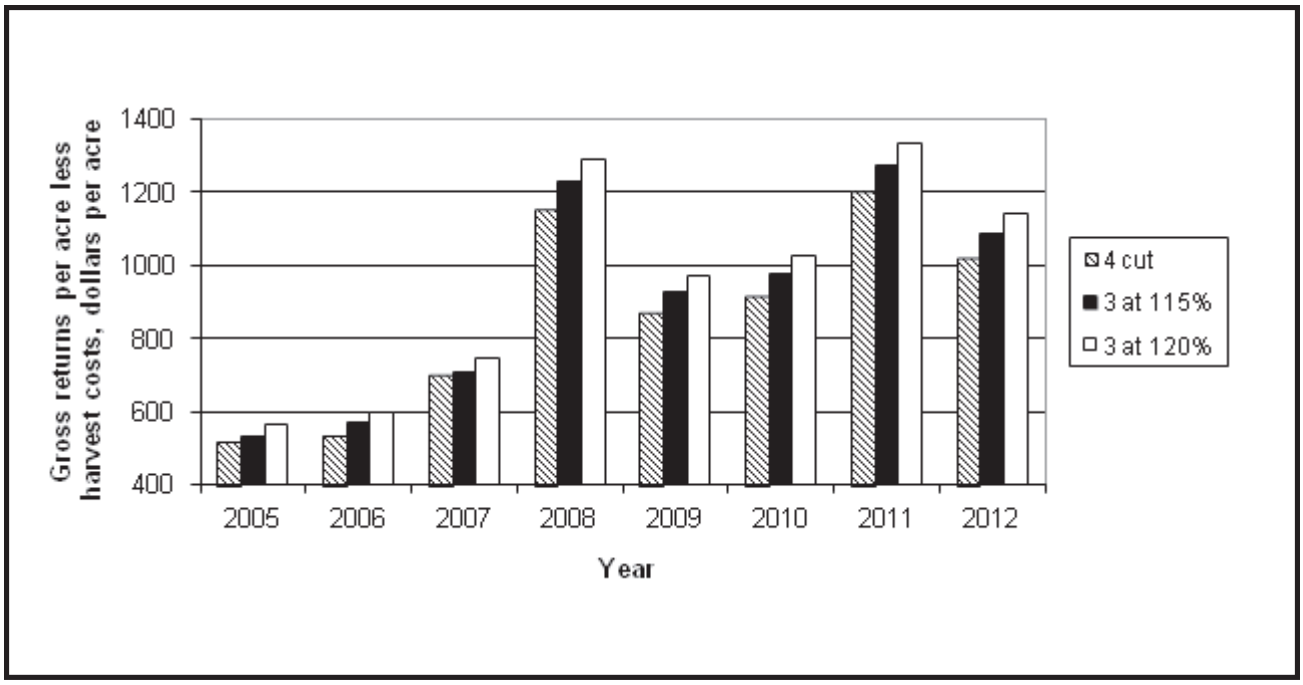


**Figure 1.** Estimated gross returns per acre less harvest costs as haylage for 3 cutting systems. Assuming 4 cuttings of alfalfa yielding 5.84 T DM, 60% at 40% NDF and 40% at 44 NDF; 3 cuttings of alfalfa at 115% of 4 cut yield, 100% at 44 NDF; 3 cuttings of alfalfa at 120% of 4 cut yield, 100% at 44% NDF.

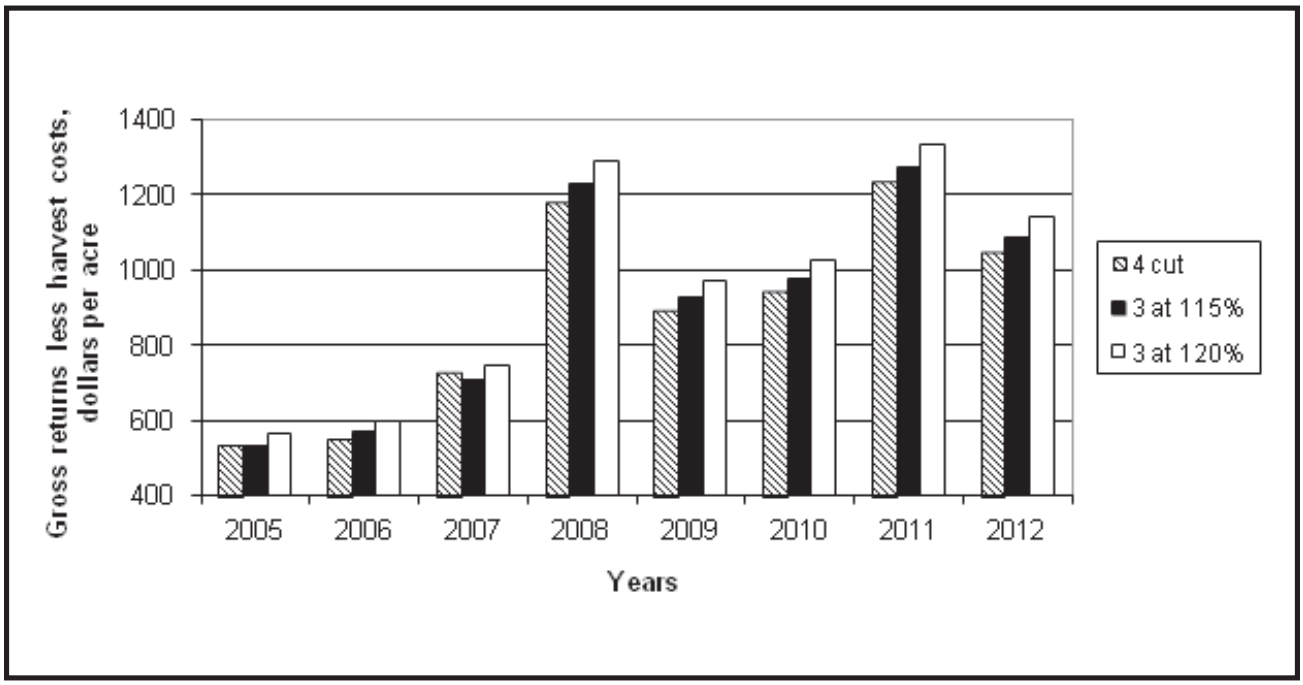


**Figure 2.** Estimated gross returns per acre less harvest costs as haylage for 3 cutting systems. Assuming 4 cuttings of alfalfa yielding 5.84 T DM, 75% at 40% NDF and 25% at 44% NDF; 3 cuttings of alfalfa at 115% of 4 cut yield, 100% at 44% NDF; 3 cuttings of alfalfa at 120% of 4 cut yield, 100% at 44% NDF.

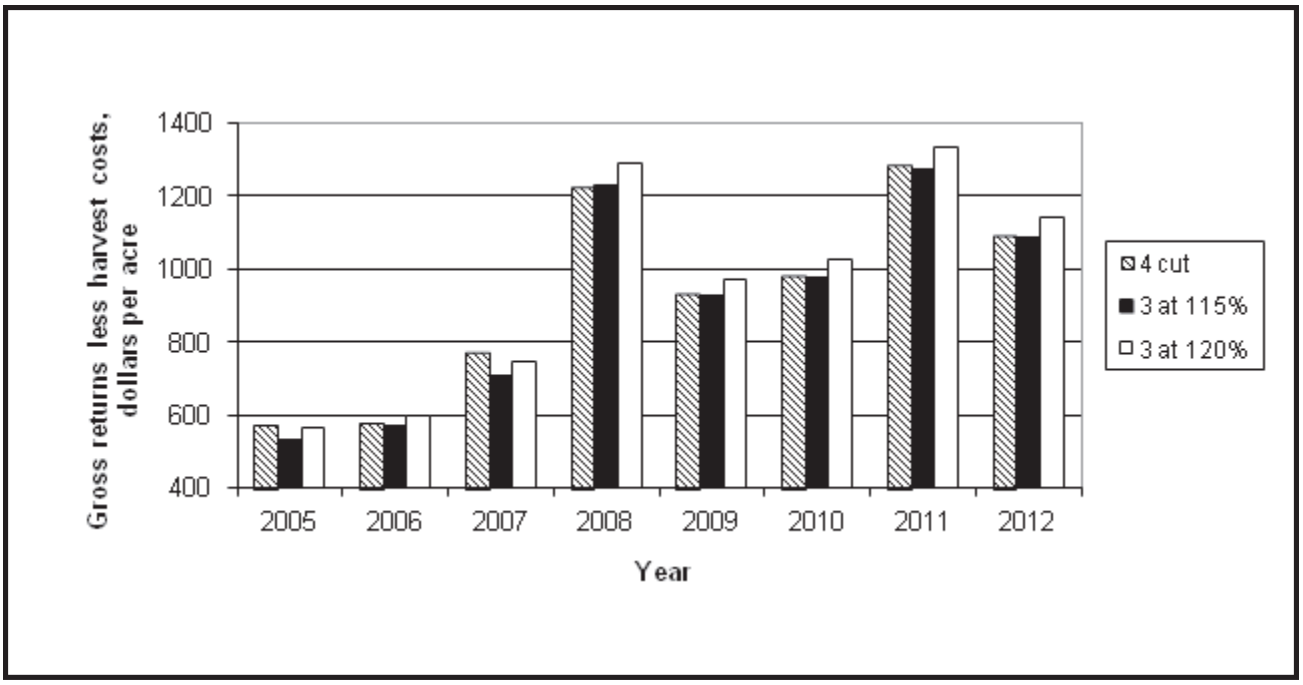


**Figure 3.** Estimated gross returns per acre less harvest costs as haylage for 3 cutting systems. Assuming 4 cuttings of alfalfa yielding 5.84 T DM, 100% at 40% NDF; 3 cuttings of alfalfa at 115% of 4 cut yield, 100% at 44% NDF alfalfa; 3 cuttings of alfalfa at 120% of 4 cut yield, 100% at 44% NDF.

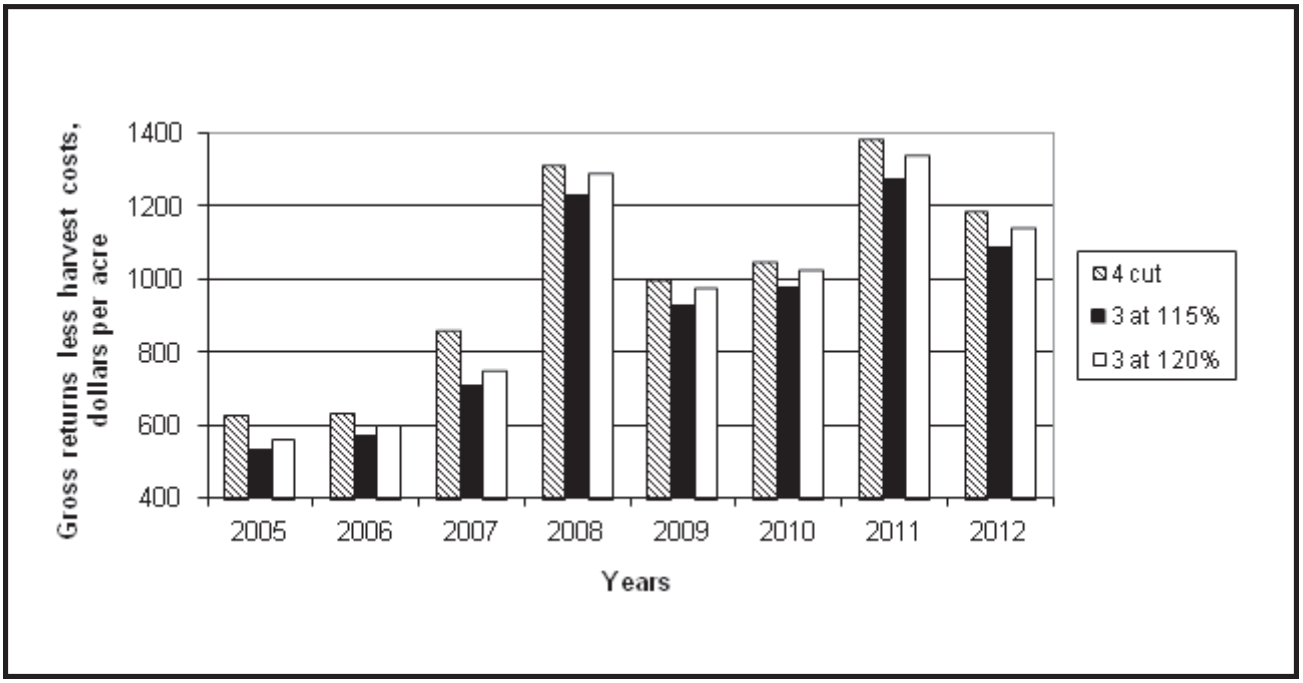


**Figure 4**. Estimated gross returns per acre less harvest costs as haylage for 3 cutting systems. Assuming 4 cuttings of alfalfa yielding 5.84 T DM, 60% at 40% NDF and 40% at 36% NDF; 3 cuttings of alfalfa at 115% of 4 cut yield, 100% at 44% NDF alfalfa; 3 cuttings of alfalfa at 120% of 4 cut yield, 100% at 44% NDF.