OMAFRA Virtual Beef

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IN THIS ISSUE

Cow Size and Efficiency

Big cows, small cows, or in between – which are the best? Science weighs in on the beef cow size debate. Check out this article to see one side of the cow efficiency story, and whether or not your preconceptions hold true...
....cover story

Planning For Success

All you need to know about business planning in 800 efficient words. From business mission to strategic vision, learn the key tricks of the trade used by successful businesses the world over. And yes, your farm is a business ... you create products, you market them to a clientele and you have to keep on top to the financials too.
.... page 4

Capital Gains and Farming

The annual visit to the tax accountant is scheduled for most farmers. One of the most critical areas of farm tax planning is the capital gains exemption. Learn what "qualified farm property" is, and the tests you need to pass to utilize this important benefit.
....page 6

Upcoming Events
... page 7

Cow Size: A Piece of the Cow-calf Efficiency Puzzle

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What answers do you choose to the following questions regarding beef cow-calf production?

Question 1
"An efficient beef cow will wean a calf that weighs at least 50% of her body weight."

True
False

Question 2
Which type of beef cows are most efficient?

1. small cows are most efficient
2. medium sized cows are most efficient
3. big cows are most efficient cow size is not related to efficiency
4. cow size is not related to efficiency

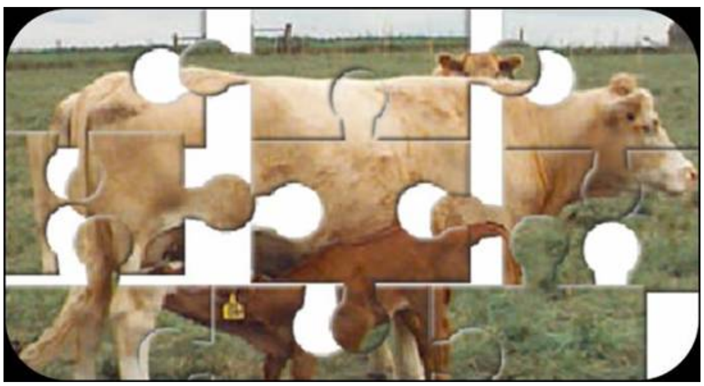

Figure 1. The cow-calf efficiency puzzle.

This publication is available in electronic format at www.omafra.gov.on.ca/english/livestock/beef/news.html

Single paper copies may be obtained by calling 1-877-424-1300

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Ministry of Agriculture, Food and Rural Affairs
Ontario

Many factors can influence cow efficiency, such as reproductive rate, milk yield, backfat level, mothering ability, and the bull's genetic input into the calf, as well as cow size. However, in this review we will focus only on the effects of cow size, and assume that all other factors are held constant so we can do a meaningful comparison. Likewise, when considering economic efficiency, we will assume that price differentials for breed types and the like are constant, allowing us to evaluate the impact of changing cow size without confounding the issue.

Productivity or efficiency?

The study of biologic efficiency in beef cow-calf production is both important and intriguing. Improved biologic efficiency is desirable as it indicates that fewer resources are used in the production of a unit of product. When economic values are applied to biologic and other inputs, as well as the product, producers are empowered to make well informed decisions regarding their production systems.

Biologic productivity in cow-calf operations can be defined as the weight of weaned calf produced per cow per year. This measure includes reproductive rate and calf survival as well as weaning weight. It is commonly recommended as a beef herd evaluator. However, while it is an excellent **productivity** measure, it does not take into account the **inputs** (such as feed) required to achieve the production. If we want to evaluate biologic **efficiency**, we have to account for feed, the major input required by the animals.

In a simplified analysis, beef cows can be considered to be biological factories. They convert feed into weaned calves. We can estimate cow biologic efficiency as the ratio of feed energy consumed to the weight of weaned calf produced. This ratio of input / output can be calculated on a per cow basis as:

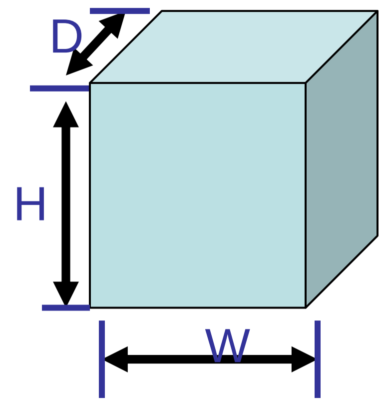
$$\frac{\textbf{kcals of feed energy consumed}}{\textbf{lbs of calf weaned}}$$

Cows which require less feed to produce a pound of weaned calf are more efficient, and all other things being equal, will be more profitable.

How size affects volume and surface area

As any 3 dimensional solid object gets bigger, two things change: the object's volume increases, and its total surface area also increases. Since an object's volume is directly related to its weight, we can say that its weight is increasing at the same rate as its volume. A critical aspect of increasing size is how the **rates** of increase for volume (weight) and surface area compare with each other.

Here's an example based on a very simple shape, the cube. The principles hold true for other shapes such as spheres, cylinders, rectangular boxes, cows, etc.



For a cube, Volume = Length x Width x Depth, or V = L x W x D

and Surface Area = (Length of a side x Width of a side) x 6, or SA = (L x W) x 6

Let's consider two cubes of different sizes: Small, which has sides of 2 inches each, and Large, which has sides of 4 inches each.

Small cube Volume = 2 x 2 x 2 = 8 cubic inches

Small cube Surface Area = (2 x 2) x 6 = 24 square inches

Large cube Volume = 4 x 4 x 4 = 64 cubic inches

Large cube Surface area = (4 x 4) x 6 = 96 square inches

The results are summarized in Table 1. As would be expected, both volume and surface area increase when we go from the small cube to the larger cube. However, the **ratio** of surface area to volume is greater for the smaller cube compared with the larger cube. The small cube has 3 in^2 of surface area for every 1 in^3 of volume, while the big cube has only 1.5 in^2 of surface area for every 1 in^3 of volume.

How body size affects cow efficiency

Now back to cows … we can apply the results of the cube comparison to beef cows. Larger sized cows have a lower ratio of surface area to weight than smaller sized cows (remember that volume is directly related to weight).

Why is this an important finding when it comes to feeding beef cows? Cows are like all other mammals in that they are "warm blooded". This means that they need to keep their core body temperature within a very narrow range,

(Continued on page 3)

around 38.5 C. Most of the time, cattle in temperate zones are in an environment which is much cooler than their core temperature, so they are continually losing heat to their environment. The rate at which an animal loses heat is directly related to its surface area. However, the amount of heat produced by an animal is directly related to the amount of living tissue it has (ie its weight). Since small animals have a high ratio of surface area to bodyweight, they tend to lose heat to the environment at a fast rate, relative to their body weight. By comparison, large animals have a low ratio of surface area to body mass and therefore tend to lose heat at a slow rate, relative to their body weight.

Table 1. Surface Area and Volume of Two Sizes of Cubes

Size of Cube	Volume (in^3)	Surface Area (in^2)	Ratio of Surface Area **:** Volume
Small (2 in. sides)	8	24	3**:**1
Large (4 in. sides)	64	96	1**.**5 **:** 1

Table 2. Energy requirements of beef cows over different body weights.

Cow wt lbs	Cow ME* Mcals /day**	Cow ME, kcals /lb of cow wt	Energy required per lb of body wt, relative to 1000 lb cow (%)
1000	15.8	15.8	100.0
1200	18.2	15.1	95.5
1400	20.4	14.6	92.0
1600	22.6	14.1	89.1
1800	24.7	13.7	86.5

* metabolizable energy in the feed consumed
** NRC for beef cattle

Table 3. Calf weights required for equivalent energetic efficiency amongst cows of different weights.*

Cow wt. (lbs.)	Weaned calf wt. (lbs)	Calf wt. as a % of Cow wt.
1000	500	50.0
1200	573	47.8
1400	644	46.0
1600	713	44.5
1800	779	43.3
***** assumes other factors such as milk yield and back fat are common across cow weight range		

One of the most important outcomes of these relationships is that smaller mammals have faster metabolic rates than larger mammals. They need to produce more heat from each gram of tissue in order to compensate for their faster rate of heat loss to the environment. This means that smaller animals have a faster rate of base metabolism, and they need to eat more food per unit of body weight to provide the extra fuel needed to power it.

These same principles apply to cows of different mature body sizes. In Table 2, the energy requirements of beef cows from 1000 to 1800 lbs are shown. While total feed energy required increases as cows get bigger, the amount of **energy** needed **per lb of body weight** decreases. As cows get bigger, they become more efficient at using feed because they need a smaller proportion of it to provide body heat. When compared on a per lb of body weight basis, an 1800 lb cow is 13.5% more efficient at utilizing feed to maintain itself than a 1000 lb cow.

How does this impact the efficiency of weaned calf production? It means that in terms of cow energetics, large cows have an inherent advantage in calf production over small cows. Table 3 helps to place these differences in perspective. If we start with a basic assumption that a 1000 lb cow should be able to wean a 500 lb calf (50% of her body weight), we can calculate the weight of calf required from larger cows to be as feed efficient. For example, a 1400 lb cow needs to wean a 644 lb calf, only 46% of her body weight, to be as efficient in feed utilization as the 1000 lb cow. An 1800 lb cow needs to bring in a 779 lb calf, only 43.3% of her body weight, to be as efficient in converting feed to weaned calf as the 1000 lb cow. (It is important to remember that this assumes that other factors such as milk yield, backfat etc. are similar across cow weights.)

Back to our definition of biologic efficiency for cow-calf production:

$$\text{Biologic efficiency} = \frac{\text{kcals of feed energy consumed}}{\text{lbs of calf weaned}}$$

Calf weight as a percent of cow weight doesn't work as a good evaluator of cow efficiency. To fairly compare cows of different body sizes we need to use a sliding scale to create targets for calf weight as a percent of cow weight. This is due to the changing ratio of surface area to body weight as cow size increases, which affects the loss of body heat.

The Bottom Line

All other things being equal, big cows tend to have an inherent feed efficiency advantage over small cows, because big cows need less energy per lb of body weight to maintain their body temperature. This is reflected in the weight of weaned calf which must be produced by different sized cows for equivalent feed efficiency. As cow size increases, the **ratio** of weaned calf weight to cow weight required for a set level of efficiency decreases. For example, a 1600 lb cow weaning a calf which is 44.5% of its weight would be as efficient as a 1000 lb cow weaning a calf which is 50% of its weight.

While these results are important, they are only one piece of the overall cow efficiency puzzle. They must be used in conjunction with other strategies, such as crossbreeding to exploit hybrid vigour in cows and calves, using terminal sires to maximize calf output per cow, and matching breeds/types to market demand.

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Planning for Success

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A speaker at a recent workshop stated: "Spend less time **in** your business and more time **on** your business". What does this mean to beef producers? The idea of spending more time developing or examining your business plan rather than working in the field or barn to ensure the day to day activities are operating efficiently may not seem too exciting!

The Canadian Chamber of Commerce e-learning centre cited ten key reasons why **small businesses fail**, and the number one reason was: "**Lack** of an adequate, **viable business plan**." If developing and maintaining a business plan for your operation seems like a daunting task – remember that a business plan is a game plan or road map for a defined period of time.

Why Plan? Planning is **essential** as it helps define goals, outlines roles and responsibilities, sets a benchmark to record and compare progress and provides essential documentation usually required by financial institutions and government assistance programs.

First and foremost you need to develop a **Strategic Vision** or a statement of where your business is headed; a **Business Mission** or a statement of how you do business; and key **objectives** and **goals** – once these are established you are ready to tackle a business plan.

EXAMPLE:

Strategic Vision:

*Farm XYZ become the **leading producer** of **grass fed beef** in the county*

Business Mission:

*Farm XYZ will produce **quality beef** products for the **local market**.*

Key Objectives and Goals:

***Expand** direct **sales** to include 20 families, 3 restaurants and 2 speciality shops.*

These three components now provide a clearer picture of **who** you are and **where** you want to **go** with your business.

Planning also includes developing a business plan that reviews the Strengths, Weaknesses, Opportunities and Threats (SWOT) of your operation.

Strengths and **Weaknesses** are the two things that are in your control, while **Opportunities** and **Threats** are less in your control, and even be totally out of your control such as the weather, world markets, etc. Knowing your strengths and weaknesses will help in addressing and dealing with the opportunities and threats that come your way.

Much attention is given to conducting a SWOT analysis of your business in the ***Quest for New Farm Value™ - Value Plus*** workshops (developed by the Canadian Farm Business Management Council and Gary Morton of Morton Horticultural Associates) being held this winter across Ontario. An exercise in the workshop includes participants:

A. Listing three business **STRENGTHS.**
Examples: Enjoy producing high quality beef; family members are engaged in the business; enjoy working with people and building customer loyalty.

B. Listing three business **WEAKNESSES**.
Examples: Little focus on financial records to understand what areas of the business are declining or growing; marketing efforts are too broad and not focused; no written business plan in place to direct the business in the short and long term.

C. Listing three business **OPPORTUNITIES.**
Examples: Growth in interest by consumer in local food, growing support for the farmer; proximity to growing urban markets.

D. Listing three business **THREATS.**
Examples: weather; world markets and economics; food recalls.

Once you have conducted your SWOT analysis you are in an excellent position to develop a plan that examines how you will build on your strengths and opportunities, improve weaknesses and manage threats.

The components of a successful business plan include a production plan, human resource plan, financial plan and a marketing plan. The marketing plan is often the most challenging to prepare as it involves trying to understand the consumer and the ever changing marketplace.

A **comprehensive marketing plan** examines global and consumer trends; reviews the marketing mix of product, price, place and promotion; and provides details of how you will market your product or service over a certain period of time.

For those new to **marketing** their product or service, marketing is often described in terms of the 4P's. The 4P's affect every marketing decision you make from production to the end user and include:

Product: Your product or service
Price: What you will charge for it
Place: The path your product will travel to get to the end user
Promotion: How will you let people know about it

Once you have addressed the **4P's** of marketing for your product it is important to continually evaluate if your marketing plan is gleaning the results you had hoped for. If not you will need to re-tool your plan going forward.

For information and resources on business planning visit:

The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) - Business Management Unit website at:

http://www.omafra.gov.on.ca/english/busdev/agbusdev.html

http://www.omafra.gov.on.ca/english/busdev/facts/08-051.htm

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The Ten Top Tax Questions on the Capital Gains Exemption

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If you asked me what is the most common tax question I get asked it would be a no brainer - **capital gains**. The **$750,000** capital gains exemption to be exact. And yes, it is $750,000 – it was increased back in 2007. The reason for all the interest is because the exemption is the single largest tax break that farmers get. Although good tax planning may yield even larger benefits over time, the capital gains exemption is seen as the "big one".

Here is my Top Ten list for farm tax questions regarding the capital gains exemption, based on the inquiries I get.

? 1. What type of property qualifies for the exemption?
Land, quota and buildings all qualify. So does an interest in a family farm partnership or shares in a family farm corporation. The technical term is "qualified farm property". Machinery does not qualify, which is OK because machinery does not usually increase in value.

? 2. How much or how long does the property have to be used in farming to make it "qualified farm property?"
There are two sets of rules depending on when the property was purchased. One is easy to meet the other is harder.
Easy Test: For property purchased on or before June 17, 1987 the property must be used in farming at the time of sale <u>or</u> for any five years during its ownership.

Harder Test: for property purchased after June 17th, 1987 the property has to be owned for 24 months **and** in at least 2 years the gross income from farming must exceed net income from all other sources. However, this income test is not applied if the property is used in a family farm partnership or family farm corporation for at least 24 months and the individual, spouse, common-law partner, child or parent was actively and continuously involved in the farming business. This fact can be advantageous for folks who have off farm income and cannot meet the income test.

? 3. Does the person who owns the property have to use it in farming?
No. As long as the property was farmed by your spouse, common-law partner, child or parent you can still access the exemption. Many **children** who inherit land from parents are surprised to learn that although they have **never farmed** the property, they **qualify** for the **$750,000** exemption. In other words if it was qualified farm property for your parent, it is qualified farm property for you and you can use the $750,000 capital gain exemption.

? 4. I used my general $100,000 capital gain exemption back in 1994 when it was eliminated. How does that affect my $750,000 exemption?
It affects it in 2 ways:

1. It **reduces** your exemption, so you now have $650,000 if you used the full $100,000.

2. It may mean that you have to qualify under the harder test described earlier.

Let me explain. Up until 1994 everyone had a personal capital gains exemption of $100,000 for general property. The budget that year eliminated this benefit, but allowed individuals to use up the exemption by simply electing to "bump up" the cost base of the asset.

If however, you elected to use the $100,000 exemption on your farm property you were deemed to have disposed of and re-acquired the property in 1994. The result: you must meet the harder post-June 1987 rules for qualified farm property on a future sale. There is no way to reverse that election.

? 5. Does the exemption apply to the individual or the property?
The **exemption** is based on the **individual**. This means that a parent might use the full exemption on a transfer to a child and then the child has the same $750,000 exemption available. Or if there are multiple children then each of them have the full exemption. Spouses each have the exemption if they are on title together.

? 6. Can I just add my spouse's name to the title before I sell the property and double up the exemption?

If the capital gain in the property is greater than the $750,000 exemption then this might seem like a good strategy. Unfortunately, the tax rules prevent you from just gifting the property to your spouse and creating an instant $750K tax break. What happens is the capital gain is attributed back to you on the sale. The only way to avoid that is to sell the property to the spouse at FMV (fair market value), charge current interest rates on any loans to the spouse and not use the tax deferred rollover provisions that can apply to a transfer to a spouse. The result … your **sale to** your **spouse** at FMV will **trigger** the **capital gain** you were trying so cleverly to move to your spouse. Instead of an attributed gain you get the actual gain. Those tax policy folks are not stupid!

? 7. Can the exemption be used upon the death of an individual?

Yes, an executor can trigger a capital gain and use the exemption with the final tax return. This increases the cost base of the property which benefits the beneficiaries, whether spouse or children. This should usually be done if the deceased individual has any exemption available.

? 8. Can I sell land to my children and then have them sell the land to "double or triple up" the capital gain exemption?

Here are two points of discussion on this topic … the assumption is that the sale to your child was below FMV would use up your exemption, and then when your children sell it they would use their exemption. Tread carefully here. If you sell the assets within a 3 year period or even make arrangements to do so, Canada Revenue Agency will consider this to be **tax avoidance** and will deem that you sold the property to your children at fair market value, thus triggering all the gain in your hands. Get tax advice on this one for sure. Secondly just in case you had not thought about this, your children really will own the assets, and all the money they get from the second sale.

? 9. Can a corporation access the capital gains exemption?

A **corporation** does **not** have any capital gains **exemption**. You might be able to use up your exemption on the transfer of assets to the corporation, but once the corporation owns it there is no further exemption. If the corporation sells the asset, 50% of the gain is taxable in the corporation and the other 50% goes into the capital dividend account from which tax free dividends can be distributed. Having said that, the shares of a family farm corporation are qualified farm property and the exemption can be used if a share sale takes place.

? 10. Can a partnership access the capital gains exemption?

Partnerships are not taxed as a separate entity. Profits flow out to the partners, which means that a capital gain on the sale of a partnership asset flows out to the partners as a capital gain. If they have access to the capital gains exemption they can use it. The exemption can also be applied to the sale of an interest in a family farm partnership.

For further questions you can please refer to my factsheets on the OMAFRA website at www.ontario.ca/agbusiness and look under the Financial Management section.

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Profitable Pastures Conference and Trade Show

Profitable Pastures will be held on March 29th in Elmwood, March 30th in Elmvale and March 31st in Cobden.

For more information visit the Ontario Forage Council Website:
http://www.ontarioforagecouncil.com/programs/61-profitable-pastures.html

Converting Barns to Fish Farms

March 20th at the Alma Research Station. Limited to 20 people. For more information contact Agricultural Information Contact Centre at 1-877-424-1300.