The Canadian Luing Cattle Association

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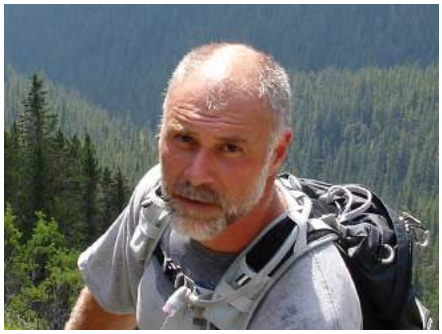
The Limitations of Genetic Change

Message from the President

Jeff Longard



The naturalist Charles Darwin, during his 1831-1836 trip around the world on *HMS Beagle*, made his first world-shaking observations of the amazing ability of animals to make use of their range of genetic heritage to adapt to their surroundings. It was later that he made a leap from these facts to the speculation that one species of animal could actually change into another species, a hypothesis that remains unproven, and frankly unlikely, to this day. It is, however, a myth to which many cattle breeders seem to adhere.

Breeders used to see their trust as keeping a uniform type that would reproduce predictable characteristics. Now, purebred promoters are touting their wares as tools to produce the *maximum change* in the offspring! Although for those raised on the current sales catalogues this may seem normal, from a historical perspective it is quite a bizarre turn of affairs. Producers are asked to believe that seedstock can now perpetuate major genetic change in their offspring, contrary to breed characteristics and in some cases even contrary to species characteristics, and that they can do this predictably, consistently and profitably. No question that this is good marketing, the grave danger here is that it is bad science.

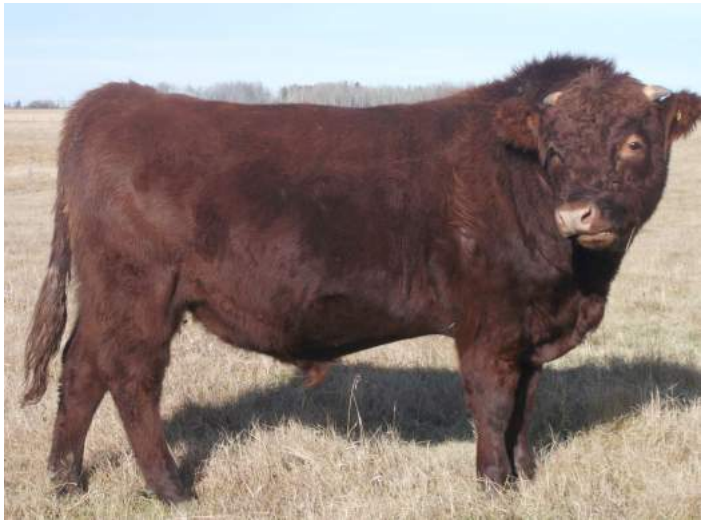
Whatever musings we may make about the past history of life on the planet, we know in our own day at least that species are limited to the genetic characteristics which exist in their makeup, and that they cannot transform, either magically or scientifically, into something they are not. Wyoming breeder Larry Leonhardt brings cold science into the warm haze of marketing when he looks critically at the elevated milk EPDs of a popular AI beef sire and wonders how it is that "'dairy' cows need nutrition to milk and are poor converters of roughage to beef… but somehow large beef cows don't and aren't, they're like another species".

No matter what characteristics are selected within a species, the offspring will always tend over time to return to an average. This is a survival trait. If survival was associated with huge meat and milk production, all we would need to do is harvest deer, antelope and wildebeest and forget this challenging and sometimes thankless job of farming. No, nature always sees any extreme as occurring at the expense of something else. This ensures that the species won't burn itself out by over-producing in an environment that limits production to moderate levels. Even in your no-expense-spared purebred farm, nature doesn't trust you: you may pile on the feed, supplements, and

Medicine River 18W exemplifies good adaptation to northern climates: moderate size, depth of rib and a rich hair coat.

pharmaceuticals, but she has had millennia to learn that as plentiful as things are this year, food or water or heat could be short next season. So even the most rigorously selected breed extremes demonstrate this trade-off. Why do you think milk cows have angular bony stilts for frames, holding up immense udders, while your favourite thick, deep and double-muscled beef cow has that annoyingly small bag?

In general, these observations are true. Now, you will quote your "exception" to me: that amazing cow that is all beef and bag. Yes — this can be



Greywood 3W. While Solomon sons tend to be moderate in all traits, they exhibit good growth and muscling.

achieved within one generation. It is rarely passed on, and when it is, it is always at the cost of ever-increasing inputs and ever-dwindling fertility. Nature tends not to reproduce a type that is extreme, since that is counter-productive for long-term survival. (Think about it: this is why we call them "terminal sires".) Even close-bred and judiciously-culled herds, the moment they are left to themselves, will begin to shed the very characteristics for which they were selected and return to a more sustainable average of all traits.

So then, is it possible to develop animals which will be "above average" in important economic traits such as milk or meat production? Of course it is, for two reasons: One, the breeder supports genetic change by providing a more nutritious and dependable food supply and a more controlled environment than nature can guarantee; and two, the breeder consciously selects for traits rather than allowing nature to choose the traits best suited to an unmodified environment. To be successful in this, a breeder should start with a population of animals that tend to show the desired traits, and should select for animals that excel in those traits without the cost of such excellence being prohibitive or the environment to support them being difficult to maintain. Simply put, this is what "breeds" used to be: animals whose adaptation maximized readily-available inputs in an given environment so that they were profitable.

Therefore, the true work of the breeder cannot be to "let nature take its course," or we will lose all the economically important traits so carefully developed. But neither can it be to create an animal so extreme that no reasonable or cost-effective environment can sustain it. The former error is the one touted by "low-input" marketers who try to convince you that tight-waisted little bulls raised on scrub will magically produce beefy calves for free. The second is the one you hear from breeders of the homogenous solid-coloured polled monster, breeders who talk long and loud about beef and milk production to drown out questions about input costs and real profitability.

By its very nature, a "curve-bending" bull is the least likely to reproduce its own characteristics. After all, it represents wild-card genetics that are unlike the breed and that are contrary to nature. Likewise, extremes that are reproducible are always terminal. The hype that 1800 lb. black or red giants are still just as "maternal" and "efficient" is frankly false. Better to select an animal whose siblings are pretty much as good as he or she is and whose mother and grandmother are still in the herd doing their job. The disintegration of predictable genetics can be hurried along by outcrossing or cross-breeding, but can be prevented by long-term close-breeding and continuing attention to selection. Talk to the breeder about whether the cattle you are thinking of purchasing are descendants of the very same type of animal that you're looking at, or whether they are "the hottest-growing big beauties out of the heifer pen." If they are the latter, they will make the breeder rich and you poor. Sadly, this is the story for most commercial cattlemen since the purebred breeders abandoned their trust as guardians of a type.✓

Back to Genuine Genetic Progress

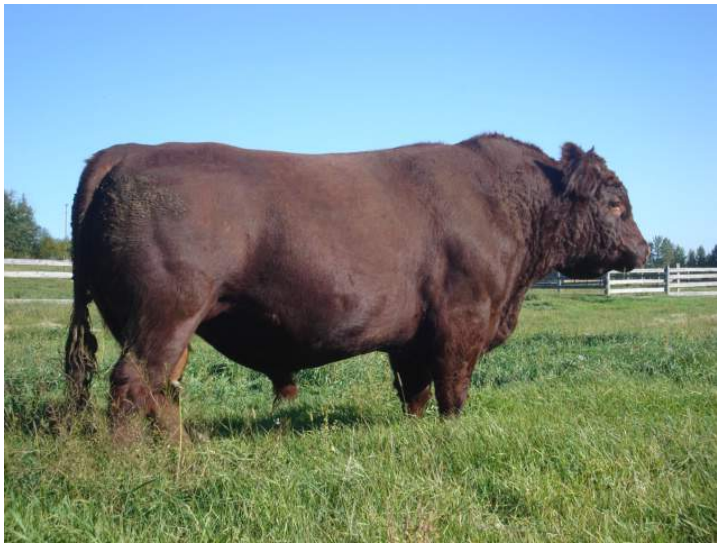
According to breeder Larry Leonhardt, a strong average is always better than a rare high-flyer

Iain Aitken *Canadian Luing Secretary*

My quest for knowledge about line-breeding has led me to a man with remarkable wisdom and experience of cattle genetics and a totally different perspective from the mainstream purebred cattle industry. That man is Larry Leonhardt of Shoshone Angus, based at Cowley, Wyoming. Larry was right at the top of the purebred Angus circuit thirty years ago before turning his back on the limelight and high prices to concentrate on producing a more consistent and profitable animal for the commercial sector. The goal now for his 600-cow herd is simply stated as: "*The development of purebred parent stock that can regularly produce beef animals which at the lowest possible cost and expenditure of labor give the highest possible and longest lasting net returns.*"

Reading back in the history of the Luing breed in Scotland, I can see many parallels between the Cadzow's development of the Luing breed and Larry's development of the Shoshone "strain" of cattle within the Angus breed. Both were spawned by disillusionment with the mainstream purebred industry and its fixation on following fads and fashions that had nothing to do with commercial beef production. After spending decades breeding cattle towards one goal in their respective programs there seemed to be an honest recognition by both of the limitations of any particular breed or strain. Not for them the hollow claims made by many breeders and breed associations that their show-ring selected cattle "can do it all and excel in every trait needed in the purebred or commercial herd." Denis Cadzow's statement that their Luing breed "*was not a wonder breed - It has been created commercially for a specific purpose*" would likely be mirrored by Larry about his Shoshone cattle.

In his booklet "The History of the Shoshone X Strain of Angus Cattle", Larry presents the most worthwhile critique I have ever read of mainstream purebred breeding practices and how they fail the commercial producer. I found many things explained that I had experienced in my own cattle breeding endeavors over the years but hadn't previously understood. It seems that most of our problems in cattle breeding do not stem from the cattle, but from human nature and our unrealistic expectations of what can be achieved. Within any contemporary group of cattle there will be an average in every trait, but that is made up of a variation of individual performance. There will be animals close to the average of the gene pool and then there will be animals towards the extreme (and opposing) ends of the spectrum on any given trait. These could be classified as the "outliers", and being so far removed from the average indicates they are the most heterozygous and thus the least likely to stamp their type on their offspring. This is unfortunate as human nature leads us to almost automatically identify the biggest, heaviest or most extreme in any trait as the "best" among the group.



Medicine River Solomon, sire of this year's offering from Medicine River Luings and Greywood Luings.

usually looking for a bull to counter the effects of the last extreme bull. If the last one was too small, we want to make sure the next one is more than big enough. Round and round we go in circles, picking different types, usually extremes, trying to correct perceived faults in our herds but always unwittingly introducing more. These trends or fashions occur not only at herd or breed level but also on an industry scale — first smaller cattle, then larger, then thicker and fleshier types. It seems we are constantly pursuing change and mistakenly acclaiming it as "genetic progress". A breed by definition is a collection of cattle that will predictably reproduce their distinguishing characteristics and traits because they have been purified over many generations to contain only that type of cattle, so why do we need to "change" them to "improve" them? I read the following rhetorical question posed recently by one of Larry's followers on the current popularity of an A.I. Angus bull with almost Limousin conformation: "How come Angus breeders don`t like Angus cattle? always choosing the bulls most unlike the Angus breed to use?" Sadly all too true, and something that applies to most breeds today.

Medicine River 10W. In addition to individual traits, careful breeders take into account "Luing type", which is an ensemble of factors that preserve the breed's character and heritage.

In reality the cow's purpose has never changed and her natural environment has changed very little. A more profitable goal for all sectors of the industry would be average performance created more predictably. The most important profit drivers in a commercial cow/calf herd are fertility and longevity, yet most bull selection is still based on growth rate and beef conformation — is that logical? It is costly to develop heifers given that you must feed them for two years from weaning until they themselves wean their first calf and give you your first paycheck. On top of that is the increased calving risk associated with heifers, the smaller calves they produce and the higher risk of failing to rebreed. I think that any cow that gets culled out of a herd after 1-3 calves is likely a loss maker. The most profitable cows in any herd are the ones that go unnoticed until you suddenly realize they are teenagers. A cow that turns in ten calves in her lifetime is always more profitable than the one that turns in even five calves. When you have cows with this type of longevity and productivity, you find that you can afford to give up a bit of weaning weight on their calves and still come out ahead. Most herds contain a few of these individuals but even if their value is recognized they prove difficult to predictably replicate using conventional breeding practices. Maybe the most common problem is that we tend to pick the wrong herd bulls based on visual assessment of phenotype. After all it is the parents combined genotypes, not phenotypes, which produce the next generation. I think too that we often confuse muscularity with masculinity and they are not the same thing. My experience has been that selecting daughters off of higher growth rate, muscular bulls seems to result in faster growing, earlier maturing

Greywood 4W. 2009-born Greywood bulls are out of Leccamore 24P and bred both sides from the venerable Lochend 223U, the "old yellow cow" that calved to age 23.

we can have it all: ever increasing performance with no increase in feed requirements and no negative trait correlations. Of course in the fullness of time the negative consequences of our selections are revealed, and this often results in extensive culling being necessary which always proves costly. It is interesting to note that USDA data shows that over the last few decades, with the emphasis on increasing production per animal, there has been no documented change in overall biological cow herd efficiency. Industry-wide cow and slaughter steer size has increased about 20% but this has required a corresponding increase in feed quantities and qualities for both maintenance and reproduction.

If we want to make real improvements to the efficiency of beef production we should aim for the economically optimum level of production rather than constantly striving for the maximum. We should have regionally and climatically adapted strains of cattle, all genetically purified and prepotent for the characteristics and traits of that strain. By cross breeding these different strains at the appropriate point in the production chain we can then harness hybrid vigor in its purest form leading to the most efficient and lowest cost beef production possible. Larry Leonhardt likes to quote American geneticist Sewell Wright's 1920 summary on cattle breeding where he concluded "the principles of the successful breeder are exceedingly simple - the difficulty is in applying them." No doubt part of this difficulty is the time factor involved as developing strains is like creating breeds all over again which is painfully slow work. Wright continues "The successful breeder establishes an ideal type, he isolates and fixes a good type by careful selection and close breeding and he brings inferior stock up by the consistent use of a prepotent sire of the same type."

In a follow up article I hope to explain how Larry actually developed his "X" strain of cattle – the process of identifying and selecting an ideal type and then stabilizing it using close breeding. I will also discuss whether we will be able to successfully apply similar breeding methodologies to produce an even more profitable Luing.✓

CATTLE FOR SALE

and a little information on what you're getting when you get Luing

Winter grazing and banked pasture may be the new buzzwords in grazing circles, but it's old hat for Luing in Canada, as seen in this c. 2002 photo of Dr Bob Church's Lochend cattle coming off the grass at Rothney in late February! For some 25 years, Bob has sent his Luings out to winter pasture, and they come home in fine condition for spring calving.

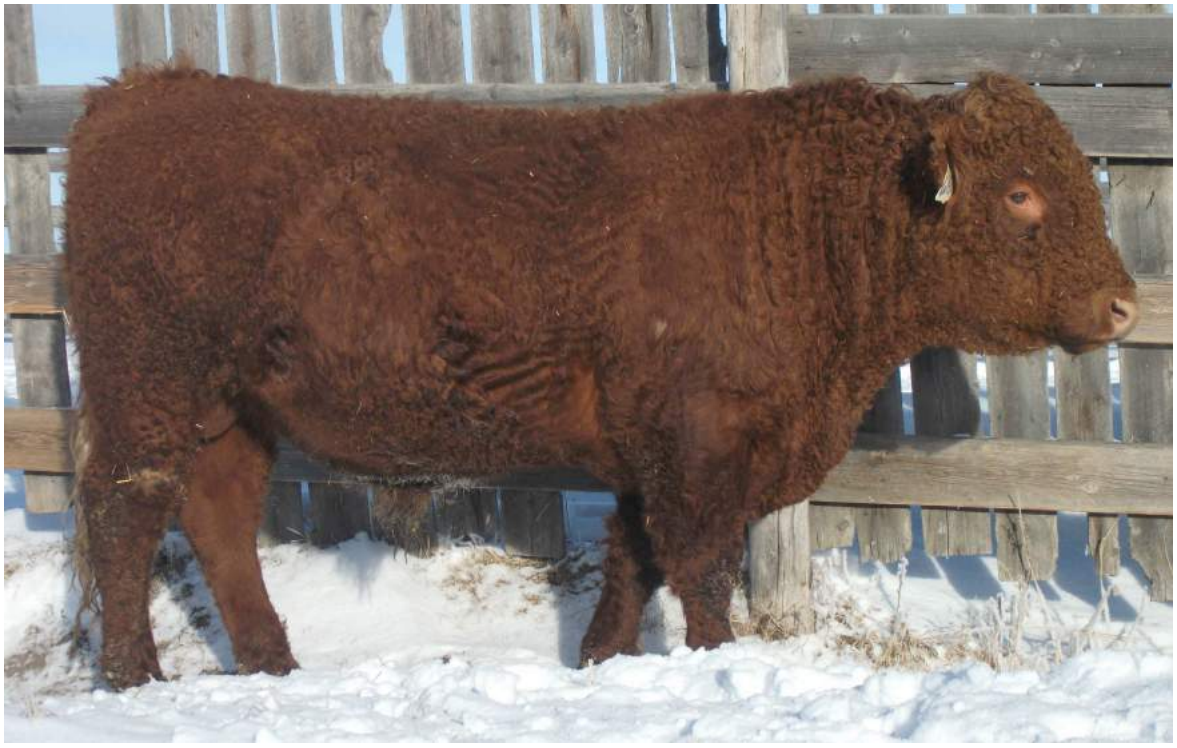
How the Luing are bred and raised

After some tough years it seems beef producers can be cautiously optimistic entering 2011 as prices for all categories of cattle have risen. As Luing breeders we share that optimism but we have to be careful not to set aside the production efficiencies we made to survive the tough times. Beef production particularly at the cow/calf level remains a very low margin enterprise so our focus will remain firmly on efficient, low cost production. Our purebred cows have always been maintained on a "least cost" basis which entails extended season grazing of dormant grass and use of healthy amounts of cereal straw when we are winter feeding. By treating our purebred cows absolutely commercially we eliminate the ones that aren't efficient foragers, lack fleshing ability or are less fertile. Our program is very different from the traditional January/February calving purebred herds and the differences don't stop with how we manage our cows.

Perhaps the biggest difference between our program and the mainstream is how we raise our bulls. Ranch experience tells us that at weaning time bull calves usually weigh 5-10% more than steers which in turn weigh 10% more than heifers. With this in mind you have to wonder why many young bulls miraculously weigh twice as much as their same aged female herd-mates when they come up for sale. The answer is simple enough – they have been raised on a totally different plane of nutrition so that they attain a higher percentage of their mature weight at a younger age.

Why is this considered normal practice, and what is the advantage *to the bull buyer* of purchasing a bull that has been developed under such a program? A bull's genetic makeup is predetermined at conception so it makes no difference to his genetic potential or that of his offspring if he weighs 700lbs or 1700lbs as a yearling. Achieving the high rates of gain common in many programs requires a substantial

input of supplementary energy usually in the form of grain based rations. This type of diet creates many problems ranging from damaged livers to reduced fertility and semen quality. Feeding too much weight onto a young bull can compromise its feet and legs and on occasion even the heart can be damaged. These problems may not all show up right away but they often result in a bull being sold for slaughter at a far younger age than expected. You only need to watch cull bulls go through the local auctions to see the high percentage that are probably only 2-4 years olds. Bulls with poor leg structure, lean, lame, non-breeders – the list is extensive and must be a substantial profit drain for the cow/calf operators concerned. A higher replacement rate due to early burn out or failure to work may prove costly to the bull buyer but it is the fuel that propels the conventional purebred industry. If you can convince buyers that it is normal to average two years work from a bull it creates a market for two or three times as many bulls. Many sale catalogs tell you to buy plenty of bulls – as much as one for every twenty cows to ensure better conception rates. The more bulls sold the larger the sales, the higher the commission, the advertising bills and of course the amount of feed supplements needed. There is a whole industry built on the back of over-fed, short lived bulls and it is financed by the commercial bull buyer.

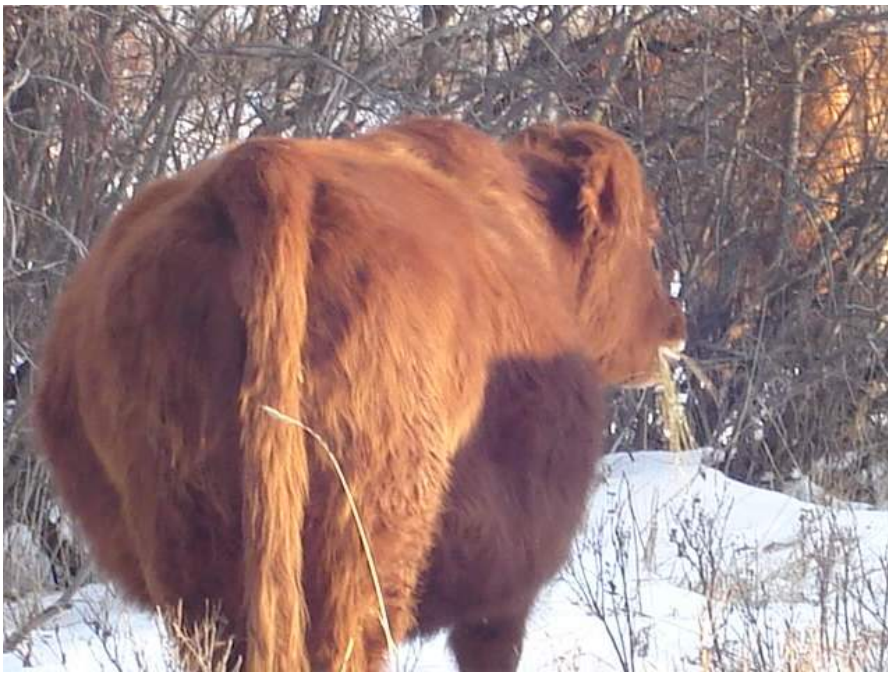


Galena Creek 81W, from this year's bull offering, shows the frame size and growth pattern preferred by many cattlemen for crossbreeding purposes, as well as possessing the characteristics to sire sound replacement females.

I suppose that what I have always found surprising is that buyers continue to be attracted to the larger, better fed cattle. It seems to be human nature to equate "biggest" with "best" but after you have bought a few and been disappointed with the results isn't it time to review the selection process? I'm sure most cattle producers will rear their replacement heifers on a plane of nutrition which balances the need to grow the animals with the cost of achieving this weight gain. If you don't grow your heifers at the maximum rate possible why would you select bulls reared this way? Or is the mainstream purebred industry just very good at marketing and always keeping the buyer's focus on the next crop of bulls it has for sale? After all, if the replacement is touted to be an EPD-topping genetic improvement over "last year's model," maybe we shouldn't feel so bad about shipping the $4000 bull as an $800 cull. A final thing to consider if you do retain your own replacement heifers is that the type of cattle most likely to pass on the important maternal traits of fertility and longevity will likely *not* be the bulls that respond best to heavy feeding on a high energy ration.

I was lucky to grow up on an operation where

and could compare their viability with that of the occasional bought in seed-stock sire. Almost without exception the slowly reared, home bred sires out-bred and outlasted the bought in sires. One exception was a Limousin bull that we bought at age two and a half weighing less than1100lbs! He went on to breed exceptionally well and sold as a sound breeding ten-year-old for almost as much money as we had paid for him initially. In this instance we had purchased an animal from an even tougher program than our own and admittedly he had been used heavily before we bought him. My preference now is to grow our bulls at an average of around two pounds a day which produces an animal around 1500lbs as a two year old. We don't try and fight nature too much so if they gain slower through the winter we know they will compensate by growing faster on grass in summer which is the time of cheapest gain. This works particularly well with our late April/May born bulls that have just turned two at the start of their second summer. The rapid increase in condition they experience as the grass turns green is timed perfectly to boost their vigor and semen production to coincide with the start of the breeding season. We find the athletic type of bull that results from being fed less and grown slower will easily breed 40 cows and usually gain condition doing so. Our mature bulls regularly come home at the end of breeding season fat and weighing 2000lbs and up. Their lower yearling weights obviously didn't limit them from reaching their mature potential but it did give them a better chance of lasting until they are eight or ten years old.



Medicine River 3M. This is the type of condition you want to see on a grazing cow in the heart of winter.

Bulls for Sale

Some of this year's rising two year old bull offering are pictured in this newsletter. We encourage you to come and view them all in person, if possible. This year's bulls come from three herds but have been raised together since weaning on our forage test. They are for sale by private treaty on a first come - first served basis. Numbers are limited so please call soon to discuss your bull requirements for the upcoming breeding season.

Please contact Iain Aitken at (403) 843 0094 for further information.

Females for sale

Lochend Luing Ranch offers a selection of the 2010 heifer calf crop for sale.

Contact Dr Bob Church at (403) 208 3747.

Semen for sale

Semen is available from Lochend Achayella (pictured