Belted Galloways and the Belted Galloway Society, Inc.

Hugh R. Crawford Carmangay, Alberta
September 20, 1994

The Belted Galloway can be considered to be a dual purpose breed—aesthetics and beef. However, in North America today the Belted Galloway has major difficulties in both areas. The striking colour pattern of the breed is marred by recurrent mismarking. And the beef characteristics of the breed have fallen far behind the mainstream of commercial cattle production. The origin and the persistence of the problems in both areas are in part a direct result of inappropriate regulations by the main governing body of the breed in North America-the Belted Galloway Society, Inc. The registration practices of the Society ignore relevant genetic principles and thus ensure the continuance of mismarking problems. And the governing of the Society does not encourage significant investment by experienced cattlemen willing to make long term commitments to the improvement of the breed. Thus the Belted Galloway does not have a severe, annual, selection pressure applied to a large, well marked calf crop by serious cattlemen using both old fashioned cow savvy and the latest technology. Instead, each year a group of well meaning, but, for the most part, inexperienced cattle owners with small herds sacrifice a portion of their calf crop to colour pattern selection and then make a best guess from the rest. As a result the breed makes little, if any, progress—colour pattern problems persist or increase, and beef production stagnates or deteriorates.

The counterproductive regulations of the Belted Galloway Society, Inc. can be divided into three groups:

1. **Colour Pattern Regulations**
2. **Purebred Cattle Regulations**
3. **Society Organization.**

1. Colour Pattern Regulations

First the difference between 'colour' and 'colour pattern'. The colour of an animal is a result of the pigment, or lack of pigment, in its hair and skin. The colour pattern is the distribution of that colour on the body of the animal. The terms 'colour' and 'colour pattern' are often confused in reference to the 'Galloway-Belted Galloway-White Galloway' family. A black Galloway with a white udder, a black Belted Galloway, and a White Galloway with black points are all the same colour—black and white. Where the three differ is in their colour patterns. The Galloway is solid coloured. The Belted Galloway is belted. And the White Galloway has a white park colour pattern.

The belted colour pattern is generally considered to be determined by a single, autosomal, dominant gene. In other words, belting is controlled by one gene, that gene is not sex-linked, and that gene is dominant to the 'wild' or 'original' type (i.e. solid coloured). However, the expression of belting in any given animal is influenced by the presence of additional genes for other colour patterns. The genetics for the other colour patterns can be dominant or recessive, single or linked in groups, or any of the myriad of possibilities between either extreme. None, however, have been demonstrated to be sex-linked.

Single, dominant, interfering colour patterns (e.g.. white face) do not present a problem. When such genes are present they are expressed and thus readily selected out. However, two colour pattern problem areas remain:

a.) Given that the genetics controlling extraneous interfering colour patterns can be recessive a Belted Galloway can carry unexpressed mismarking genetics. This is further complicated by the fact that some of the extraneous colour patterns may involve more than one gene at more than one loci (i.e. genes from more than one location in the chromosomes). These colour patterns are only expressed when the right combination of different genes are present -Thus even well marked individual Belted Galloways can carry 'hidden' mismarking that can 'reappear' in later generations.

b.) Given that belting itself is dominant any animal with only one belting gene (i.e. heterozygous) can be belted. Yet only animals with two belted genes (i.e. homozygous) will 'breed true' and produce only belted calves. Homozygous animals cannot be identified by pedigree, visual inspection, or laboratory test. Only a breeding test involving appropriate matings can differentiate between homozygous and heterozygous belted animals.

These two factors—the recessiveness and interaction of some mismarking, and the dominance of belting— set limitations on the types of registration practices appropriate for the Belted Galloway breed:

A. Extra colour patterns should not be introduced to the breed
B. Mismarked animals should be identified
C. Probable homozygous animals should be identified.

Unfortunately, the present regulations of the Belted Galloway Society, Inc. fail totally on all counts.

A. <u>Introduction of Extra Colour Patterns</u>

The Belted Galloway Society. Inc. has an open herd book. The only restriction on the other than Belted Galloway used for upbreeding is that they must be cows. 'Cow' is a term used to refer to the adult females of several mammalian species as diverse as the blue whale and the elk. However, in North America, a Belted Galloway bull is likely to be mated with cows of only four species:

a.) *Bostaurus*— European cattle
b.) *Bos mdicus*— zebu or 'brahman' cattle
c.) *Bosgrunruens*— yak
d.) *Bison bison*— plains bison or 'buffalo'

The first cross would be the most likely and the fourth cross would probably not be welcome in the herd book. Whether or not crosses with *Bos indicus* and *Bos grunmens* would be eligible for registration is not indicated. The term 'cow' as used by the Belted Galloway Society, Inc. does not specify species, breed, or colour.

Unfortunately, every time an other than homozygous solid coloured cow is used to produce half-bloods more extraneous colour pattern genetics is added to the population. The homozygous aspect here is crucial. The extraneous colour patterns that should most be avoided are recessive and/or linked and thus hidden in the heterozygous solid coloured state. Homozygous solid coloured cows could be identified by breeding tests from the commercial cow population. However, such testing would be impractical given that it would be necessary to test for all recessive non-solid colour patterns. The only practical source of cows with a high degree of probability for homozygous solid coloured genetics is the pedigreed cows of solid coloured breeds. The Belted Galloway registries in the United Kingdom, Canada, and Australia already have such restrictions. Until the Belted Galloway Society, Inc. does the same it will not be possible to control mismarking in the American Belted Galloway population. All outside genetics in the herd book must come only from pedigreed animals of solid coloured breeds.

B. Identification of Mismarking

The Appendix to the Herd Book of the Belted Galloway Society, Inc. is used to record both upbred females (1/2, 3/4, and 7/8 Belted Galloway) and mismarked 'purebred' females. (Actually both fullblood and purebred females. See later definitions.) Every application for registration or recordation of a Belted Galloway with the Belted Galloway Society, Inc. includes a sketch of the animal. However, the importance of those sketches is not stressed and their accuracy is questionable. And, in addition, the sketches are simply filed. Given that there are no colour pattern restrictions on any females in the Appendix, mismarking is not noted in Appendix numbers or on Appendix pedigrees. It can be assumed that any 'purebred' female in the Appendix is mismarked but mismarked percentage females are not identified. And further, the type of mismarking is not noted for any animal.

Recording untracked mismarked females in the Appendix appears to have been tolerated for two reasons:

a.) a conviction that the Belted Galloway is a rare breed and that it is thus inappropriate to lose' any genetics.

b.) a conviction that little can be done about mismarking. Well marked animals can produce mismarked calves and mismarked animals can produce well marked calves.

Both conclusions are seriously flawed:

a.) a breed with an open herd book and a group of serious breeders is not endangered. Under the current regulations of the Belted Galloway Society, Inc., the Belted Galloway in the U.S.A. has available to it the entire bovine gene pool of the planet.

b.) the disappearance and reoccurrence of mismarking in the Belted Galloway often noted by frustrated breeders is probably a result of recessiveness and linkage in extraneous colour patterns. To the extent that those extraneous colour patterns are inheritable, mismarking can be controlled by appropriate breeding.

However, the mode of inheritance of those extraneous colour patterns and their distribution through the Belted Galloway are unknown. Without that knowledge it is impossible to consistently plan and complete an appropriate breeding program. The occurrence of many perfectly marked individual Belted Galloways tends to indicate that most, and possibly all, forms of mismarking are inherited and inherited independently of belting. However, that inheritance is intricate enough that mismarking will probably not be successfully controlled by the current intuitive mating practices. Further, until the inheritance and distribution of mismarking are better understood, even professional advice on appropriate matings will be of little help.

The belted colour pattern involves a complete white belt around the body of the animal. Mismarking can effect either and/or both the coloured and/or white components of the pattern. Extra colour can make the belt narrow, irregular, incomplete, broken, and/or put coloured spots in the belt. Those spots can include both the hair and skin, or just the skin. Extra white can make the belt wide and/or put extra white elsewhere on the body. The most common extra white, and probably the most common form of mismarking in purebreds, is white on the lower, hind legs and/or feet.

In fact the only form of mismarking currently monitored is white below the dew claws of herd book females. There are two genetic complications with singling out white on the lower legs and/or feet of herd book females for preferential treatment:

a.) None of the genetics for white in the Belted Galloway is sex-linked. Females with white on the lower legs and/or feet have the same colour pattern genetics as similarly mismarked males.

b.) There is no documentation that any genetics restricts the extra white to below the level of the dew claws. There is good reason to believe that the same genetics that puts white below the level of the dew claws also regularly

puts white higher on the leg and periodically puts white elsewhere on the body.

Thus two problems arise:

a.) Animals with identical genetics and identical abilities to 'pass-on' mismarking are treated differently by the Belted Galloway Society, Inc.

b.) Genetics that can probably periodically put fairly large patches of white on the body is maintained.

The 'dew claw' rule also presents potential problems from an administrative point of view. The dew claws are on the back of the lower legs. Dew claws do not encircle the legs. White on the legs below the level of the dew claws but on the front of the legs is not technically below the dew claws. It would be more accurate to state ^below the level of the dew claws' or 'below the fetlock joint'. Also the dew claws are not points but are rather several centimeters deep. Is 'below' meant to be below the top, middle, or bottom of the dew claws? Is the rule meant to include animals with both colour and white below the level of the dew claws? (Some animals have white 'anklets' rather than 'socks'.) Does the rule apply only to hair and skin, or are white hooves permissible? And the inevitable question: What about the animals with two white hairs above the level of the dew claws?

This last, somewhat flippant question, actually brings up a very important point. The expression of white on the lower legs and/or feet is random. The genetics involved does not restrict the white to below any anatomical point. A subjective word like 'small', 'slight', or 'moderate' to indicate the amount of white better describes the physical expression (i.e. phenotype) of the genetics involved. (With a subjective description each breeder would be obliged to decide for themselves where 'small', 'slight', or 'moderate' stops. The market place would probably rapidly apply any necessary correction to the breeders' interpretation.) Thus, although the Belted Galloway Society, Inc. is tracking one form of mismarking, the Society is in the process collecting misleading data of little genetic value. The information collected will be of questionable value in the understanding of the inheritance of white feet and, thus, in the control of mismarking. And, to the extent that monitoring white below the level of the dew claw implies that any extra white on any progeny will be restricted to below the level of the dew claw, the Belted Galloway Society, Inc. is misleading its breeders.

Mismarking will only be controlled through appropriate planned matings. Those matings can only be planned when both the inheritance of mismarking and the genetic history of the mated individuals is understood. The first step in acquiring that knowledge is to appropriately categorize, identify, and track the various forms of mismarking. Appropriate accurate tracking will:.

a.) supply the raw data necessary for a professional interpretation of the inheritance of mismarking.

b.) supply the history on each animal necessary for breeders to productively use that interpretation.

However, not all forms of tracking will fulfill this dual roll. To do so the categories of mismarking identified and tracked must be consistent with the genetics of colour pattern inheritance in the bovine.

Thus the mismark categories used in the tracking process should be decided in consultation with appropriate professionals. Care should be taken not to split the physical expression (i.e. phenotype) of any one genetic cause into more than one category (e.g., white on the lower legs divided into above and below the level of the dew claws). Splitting would cause unnecessary record keeping and could result in unreasonable expectations - (e.g., There is probably no genetics that can keep white below the level of the dew claws.) Care should also be taken not to group together forms of mismarking that could have different genetic causes (e.g., narrow belt and spots in the belt). Grouping would significantly reduce the value of the information collected without reducing the amount of record keeping. It should be noted that:

a.) some forms of mismarking should be culled and thus will not warrant tracking (e.g. white face and no belt).
b.) any one animal can have more than one form of mismarking.

The categories developed must then be described simply and accurately so as to be understood and used by all breeders.

The single most effective way to ever control mismarking would be with such a 'genetically friendly' mismark tracking program. This approach could control mismarking even faster than the more drastic measure of refusing registry to all mismarked animals. The 'cull' approach has three major drawbacks:

a.) to cull all mismarks does not remove the carriers of recessive extraneous colour patterns (i.e. the mismarks' parents) and thus, by itself, does nothing to reduce the incidence of mismarking.

b.) to cull all mismarks does not identify the carriers of recessive extraneous colour patterns to, and for the benefit of, other Belted Galloway breeders.

c.) to cull all mismarks does not add to the data base of mismark inheritance essential to understand and control mismarking,

The initial design of a 'genetically friendly' mismark tracking program and the periodic review of accumulated data would take extra time and effort. However, the day-to-day administration of the program would add little to the time and expense of operating the registry. A 'genetically friendly' mismark tracking program, periodic review of the accumulated data by qualified personnel, and dissemination of any conclusions to breeders could significantly reduce the incidence of mismarking in Belted Galloways.

C. Identification of Homozygosity

In any domestic population with an important dominant trait an attempt should be made to identify those individuals homozygous (and thus 'true breeding") for that trait. In the case of the belted colour pattern of the Belted Galloway there are two possible approaches:

a.) identify individual homozygous animals through breeding tests.
b) assume that the foundation animals had a high degree of homozygosity and identify direct descendants of those animals.

These two approaches are not exclusive and could be combined in some way. Neither, however has been attempted by the Belted Galloway Society, Inc.

The breeding tests required to identify homozygous individuals are not difficult. A test producing ten or more calves, all belted, from matings with homozygous solid coloured cattle gives a 99.9% verification that the tested animal is homozygous belted. Those ten calves need not all be born in the same year. Nor must they be produced from ten different matings. All matings must, however, involve one solid coloured parent. And, all matings must produce only belted calves. Ten calves from a test sire is obviously not difficult, and, with embryo transfer, ten calves from a test dam is not impossible. Given an open herd book the belted calves produced in a test could be recordable as half-bloods.

The second approach—to assume a high degree of homozygosity in the foundation animals—is easier but far less reliable. First three definitions;

a.) Foundation Belted Galloways would be the original animals admitted to the original herd book. Some of the ancestry of those foundation animals could have been unknown. None of the ancestors of those foundation animals would have had Belted Galloway registration numbers.

b.) Fullblood Belted Galloways are animals with every line of ascent in their pedigrees traceable only to foundation animals.

c.) Purebred Belted Galloways are animals with upbred backgrounds that have, in theory, attained a predetermined percentage of Belted Galloway ancestry.

It is tempting to assume that the foundation animals were 'true' Belted Galloways and thus their fullblood descendants are 'true-breeding' (i.e. homozygous). However, the original Belted Galloway herd book was not started until 1921 and remained open to inspected animals for several years. Note:

a.) There was no attempt to chose only homozygous belted animals as foundation Belted Galloways,

b.) Each individual foundation Belted Galloway could have been heterozygous. (Those entered in the original herd book with one Galloway parent definitely were.)

c.) There has never been an attempt to identify and remove heterozygous fullbloods.

d.) There are far too few generations in a small population between the original foundation animals and the present fullbloods to have identified all heterozygosity by casual observation.

Thus, although the probability of homozygosity in fullbloods may be somewhat higher than in purebreds, there is no assurance of homozygosity in any given individual fullblood.

Besides, the Belted Galloway Society, Inc. has not been keeping track of its fullbloods. Most breed societies with open registries actually maintain two herd books. One closed for fullbloods. And one open with an an upbreeding appendix for purebreds. The Belted Galloway Society, Inc. has only one herd book and registers fullbloods and purebreds together under a continuous numbering system with no distinguishing notations. Thus Belted Galloway fullbloods can only be identified through a thorough pedigree search. A search that must go to foundation animals, not just the United Kingdom herd book, because the herd book in the United Kingdom also mixes fullbloods and purebreds. Thus, for the average breeder, fullbloods are not identified for either:

a.) fullblood X fullblood matings to increase the fullblood population, or
b.) fullblood X purebred or fullblood X appendix matings to stabilize the percentage of Belted Galloway in the purebred population.

The result is a continual decrease in the percentage of foundation Belted Galloway in the purebred American Belted Galloway population.

In an upbreeding registry with a 'fullblood-purebred' distinction, the percentage of that breed in the purebred population can be stabilized. Although every outside animal used is 0% foundation ancestry, every fullblood animal used is 100%. By planned balancing of the two extremes the purebred breeders can consistently produce purebred animals of a desired percentage. However, in an upbreeding registry without a 'fullblood-purebred' distinction the percentage of that breed in the purebred population continually decreases. Every outside animal used is still 0% foundation ancestry, but the 100% fullbloods necessary to stabilize the final percentage in the purebreds are not identified. The continued use of 0% foundation outside animals without the appropriate balancing proportion of 100% fullbloods reduces the percentage of the foundation breed in the purebred population.

The Belted Galloway Society, Inc. registers 15/16 females and their progeny as purebreds. Consider the scenario where 15/16 females (and 31/32 males) are registered as purebreds, the generation interval is kept to a minimum (i.e. two

years), and no fullbloods are used after the initial crosses. This last assumption is not unreasonable. Fullbloods are not mandatory in the upbreeding program; fullbloods are difficult to identify; fullbloods will have to be procured from outside the herd; and fullbloods will tend to be more expensive than purebreds. Within forty years the percentage of Belted Galloway in the newest crop of 15/16' (i.e. presumed 93.75%) females can have dropped to as low as 79.18%. And the percentage of Belted Galloway in the newest crop of '31/32' (i.e. presumed 96.88%) males can have dropped to as low as 81.56%.

The Belted Galloway registries in both the United Kingdom and the U.S.A. have been open without 'fullblood-purebred' distinction since the initiation of their respective herd books. Over seventy years in the United Kingdom and approximately forty years in the U.S.A. In addition note:

a.) The Belted Galloway Society in the United Kingdom admits 7/8 females and 15/16 males as purebreds. At this level, within forty years the 7/8' (i.e. presumed 87.50%) females can be as low as 57.08% Belted Galloway and the 15/16' (i.e. presumed 93.75%) males can be as low as 58.82% Belted Galloway.

b.) From November 1990 to September 1991 the Belted Galloway Society, Inc. also admitted 7/8 females (and thus 15/16 males) as purebreds.

c.) The Belted Galloway Society, Inc. will deem any belted female as 1/2 Belted Galloway-even those without any Belted Galloway ancestry. A purebred from this source can be admitted to the herd book after only three Belted Galloway crosses (i.e. the equivalent of 7/8 Belted Galloway). And for ten months in 1990-91, they could have been admitted after only two Belted Galloway crosses (i.e. the equivalent of 3/4 Belted Galloway).

d.) The Belted Galloway Society, Inc. will deem any purebred belted female as 3/4 Belted Galloway—presumably even those from other belted breeds without any Belted Galloway ancestry. A purebred from this source can be admitted to the herd book after only two Belted Galloway crosses (i.e. the equivalent of 3/4 Belted Galloway). And for ten months in 1990-91, they could have been admitted after only one Belted Galloway cross (i.e. the equivalent of 1/2 Belted Galloway).

There may be valid political and/or historical reasons to backtrack and identify fullblood Belted Galloways. However, to identify fullbloods at this point would have limited genetic use and could have legal complications. What the Belted Galloway needs is an identified population of homozygous belted animals. Any fullbloods identified today would not necessarily constitute such a population. The foundation Belted Galloways were not all homozygous. There has not been a consistent attempt to identify and remove heterozygous fullbloods. Seventy years of even casual observation with appropriate cubing could have significantly reduced the incidence of heterozygosity. However, those seventy years have passed without fullblood identification and without an informed selection pressure. As a result, all fullbloods, identified or not, are not homozygous.

It could be argued that to retroactively identify fullbloods would enhance their value at the expense of the value of purebreds. To thus reduce the value of purebreds after years of treating purebreds and fullbloods as equals could be argued to be unfair and could lead to litigation. With little justifiable genetic basis for a belated identification of fullbloods, such a litigation could conceivably be successful. It might be helpful to instead start an entirely new herd book with stricter entrance requirements such as perhaps 'full bloodedness'. However, what the breed needs is an identified population of homozygous belted animals. Any new herd book started should probably be restricted to animals with some specified degree of documentation for homozygosity for belting.

Further, the 'fullbloodedness' of any retroactively identified fullblood could be legitimately questioned. First, it would be necessary to trace all lines of ascent to foundation animals not just the United Kingdom herd book. Second, note that a pedigree is only as reliable *as* the information supplied to the registry by breeders. It is a common human folly to be only as careful, and thus as accurate, as the situation demands. There was little incentive to meticulously separate fullblood and purebred matings when 'fullbloodedness' was not rewarded. Especially when;

a.) most American Belted Galloway breeders are not cattlemen but rather well meaning, but inexperienced, cattle owners with little practical knowledge of animal husbandry and bovine mating.

b.) the Belted Galloway Society, Inc. has not employed a random parentage verification program.

A significant proportion of the Belted Galloways in the U.S.A. are purebred and appendix. Many herds are engaged in upbreeding and on many farms there are both fullblood and purebred matings. Thus the opportunity for error has existed--but the incentive to avoid error has not. This is not to state that a retroactive fullblood pedigree would necessarily be useless. However, it is probable that a retroactive fullblood pedigree would be less accurate than that same pedigree if fullbloods had been continually identified. The significance of that potential for reduced accuracy is an unknown.

In summary:

a.) The foundation Belted Galloways were not all homozygous for belting and fullblood Belted Galloways have not been subsequently tracked.

b.) There has never been a coordinated attempt to identify and remove heterozygous Belted Galloways from any level of any Belted Galloway registry.

c.) The percentage of Belted Galloway in the purebred American Belted Galloway population has been, and with current regulations, will continue to, decrease.

d.) The percentage of heterozygosity for belting in the American Belted Galloway population has been, and with current regulations, will continue to, increase.

That increase in heterozygosity results in an increase in:

a.) non-belted calves from belted parents. Non-belted calves are usually those calves that did not inherit belting from either heterozygous parent and are thus themselves homozygous non-belted.

b.) mismarked calves with imperfect belts. The modifiers that take "bites' out of belts and put spots in belts are more readily expressed when an animal has only one belted gene (i.e. *is* heterozygous). (Note here that there are animals without visual belts that actually have extremely imperfect belts. Such animals are probably heterozygous belted with enough modification to completely obscure the belt.)

It would thus be advantageous to identify and track heterozygous animals. Given, however, that heterozygosity is both undesirable and not visible, it is very doubtful if such a program would ever receive the cooperation it needed to be successful. Homozygosity, on the other hand, although it also is not visible, is highly desirable. To be identified as homozygous would have its rewards and a homozygosity identification program could thus probably be successful. There could be no short cuts, however. A homozygous identification program would have to involve simple, monitored, breeding tests and appropriate recognition.

2. Purebred Cattle Production

There are ten problem areas in the current regulations of the Belted Galloway Society, Inc. related to the registration of purebred cattle that do not involve colour patterns;

A. Horns

The Belted Galloway is a polled breed. However, the regulations of the Belted Galloway Society, Inc.:

a.) allow for the continual introduction of the horn factor.
b.) allow for the registration of genetically horned animals.

The horn factor can be continually introduced through the same lack of control on the breeding-up program that allows for the continual introduction of extraneous colour patterns. Just as all outside animals used in up breeding should be homozygous solid coloured to avoid extraneous colour patterns, all outside animals should also be homozygous polled to avoid horns. As with homozygous solid coloured, the only practical source of probable homozygous polled animals is the pedigreed animals of polled breeds. Thus all the outside animals used in the production of appendix Belted Galloways

should be pedigreed animals from polled, solid coloured breeds. Again, this restriction is already in place in the United Kingdom, Canada, and Australia.

In addition, the current regulations of the Belted Galloway Society, Inc. stipulate that Belted Galloways must be 'free of horns'. De-horned, and thus genetically horned, animals are as 'free of horns' as genetically polled animals. Free of horns or scurs ' must be changed to read 'polled and free of scurs'.

B. <u>Hair Colour</u>

The colours of Belted Galloways that can currently be registered with the Belted Galloway Society, Inc. are restricted to black, or black with a brownish tinge, or dun'. The list does not include red. Thus two problems arise:

a.) Black with a brownish tinge' is not a colour in the same sense a black, dun, or red. The 'black' of 'black with a brownish tinge' is caused as the same gene as the colour black. The 'brownish tinge' is generally believed to be the result of a nutritional and/or metabolic deficiency coupled with the length of the hair.

b.) There is no historic or genetic justification to exclude red from the list. First, the Belted Galloway originated from the indigenous cattle of the Galloway district in Scotland. Those indigenous cattle included reds. Second, the pigments that produce black and red are chemically very similar and the genes that cause them are allelic (i.e. they share the same loci or location on the chromosomes). Every black haired mammalian population on the planet probably includes some individuals with the gene for red hair colour. The occurrence of some reds in a black population does not indicate 'impurities' or outside genetics. Rather, the occurrence of some red indicates that the population is normal.

C. <u>Sexism</u>

The present regulations of the Belted Galloway Society, Inc. limit upbreeding to the use of Belted Galloway males on outside or percentage females. However, the belted colour pattern is not sex-linked and there is no genetic justification for a sexist registration policy. A half-blood with a Belted Galloway dam is as much a half-blood as one with a Belted Galloway sire. In fact, given that all genetic material is not confined to the nucleus, every animal is actually more closely related to its dam than to its sire. The sire supplies one-half of the nuclear genetic material for its offspring. The dam supplies the other half of the nuclear genetic material and all of the cytoplasmic genetic material. The importance of this maternal cytoplasmic inheritance is not known but it is possible that it could effect some aspects of embryology. The belt is probably formed fairly early in embryo development.

The original rational for the sexist restrictions in the appendix was undoubtedly pragmatic. There were more Belted Galloway bulls available than were needed for purebred use. The Appendix created a market for those bulls while at the same time increasing the total number of Belted Galloways.

Although a sexist approach increases the quantity of Belted Galloways, it is not the best approach for the sake of quality. The solid coloured, polled breeds from which Belted Galloway breeders should be acquiring all their outside genetics also have more bulls than they need for purebred use. The best, and most reasonably priced, beef production genetics available from those breeds will be available through bulls and/or A.I. Thus, in addition to not being necessary, sexist restrictions can be counter productive.

There is also no reason why each successive generation in the appendix must produce a higher percentage of Belted Galloway. The Appendix could simply record the exact percentage of Belted Galloway from any given mating. The breeder could then use outside males and/or females, percentage males and/or females, and/or purebred males and/or females in whatever combination or order best suits their breeding program. This freedom could become essential in any future anti-mismarking programs. 'Purebred' could be defined as any animal over a designated percentage of Belted Galloway. The registry's computer could then be programmed to calculate the exact percentage of Belted Galloway and not round any percentage upwards. The result would be simple to administer, fair to all breeders, and effective as an aid to both reduction of mismarking and improvement of beef production.

D. Parentage Verification

Parentage verification can be used as a tool to encourage accuracy, discourage dishonesty, and sort out confused or unknown pedigrees. An effective program involves three aspects:

a.) oblige the membership to verify any doubtful parentage.
b.) empower the registry to request parentage verification.
c.) implement a random parentage verification program.

The current regulations of the Belted Galloway Society, Inc. empower the Society to blood type any animal to verify parentage. However, the current rules:

a.) confuse the term 'blood type' (the technical process) with the term 'parentage verification' (the professional decision).
b.) stipulate blood typing as the process to be used for parentage verification whereas there are other reliable methods of verification.
c.) do not oblige the membership to verify any doubtful parentage.
d.) do not initiate a random parentage verification program.

Care should be taken in a random parentage verification program to:

a.) make the process truly random. The object is not to catch errors, but rather to encourage accuracy and discourage dishonesty. To apply that pressure, parentage verification must involve an element of surprise. Do not, for example, check every one hundredth animal. Rather, check an average of one animal in every one hundred. No breeder should ever be aware of when the next test is due.

b.) always give the breeder the benefit of any doubt. Parentage verification finds errors, not dishonesty. Any breeder can make a mistake.

E. Tattoos

Pedigrees are only *as* accurate as the records of the breeders. Those records require permanent identification of individual animals. Although the permanent part of the identification may not be in day-to-day use, it is the permanent identification that is the final reference point. The permanent identification is the key both to the day-to-day identification and to the pedigree. It is the permanent identification that is used to confirm purchases and sales, and sort animals when the day-to-day identification fails. For their permanent identification the Belted Galloway Society, Inc. stipulates that each Belted Galloway shall be tattooed. Further, no two animals of the same sex, in the same year, registered by the same breeder shall have the same tattoo. Therefore, many tattoos are actually duplicated. Individual animals of different sex, born in different years, and/or from different breeders can have the same tattoo. Duplicate tattoos are not accurate forms of individual identification. Further, the possibility of any duplicate tattoos in the tattoo system seriously jeopardizes the credibility of the entire system. Any given tattoo could be duplicated and, therefore, for any given Belted Galloway, there could be other Belted Galloways with which that animal could be confused.

Accurate pedigrees require that every animal have unique permanent identification (i.e. a unique tattoo). There is a very simple procedure to automatically allot each animal a unique tattoo. Each herd registers a unique set of herd identifying letters. Each animal in the herd is assigned a different number. (The numbers can be repeated again the following year if desired.) And each year is identified by a coordinated year letter. The combination of herd letters, animal number, and year letter automatically gives each animal in the registry a unique tattoo. With a little effort, the system could be coordinated with other Belted Galloway registries to potentially give each registered Belted Galloway on the planet a unique tattoo.

F. Genetic Defects

The Belted Galloway Society, Inc. has a separate 'Section VII' set aside in its regulations for 'Genetic Defects...' However, the section is 'reserved' and contains no rules.

Every breed has a few deleterious genetic abnormalities and every breed registry needs policies in place to handle those abnormalities. All members must be obliged to report all deleterious, genetic, abnormalities. Cattle with those abnormalities must not be registered. And an effort must be made to understand genetic problems and track carriers.

Besides the deleterious genetic abnormalities common to most other breeds the Belted Galloway has at least three others to watch for

a.) mannosidosis that the Belted Galloway could share with the Galloway, Angus, and Murray Grey.

b.) tibial hemimelia that the Belted Galloway could share with the Galloway.

c.) a 'hairless belt' problem unique to the Belted Galloway. The 'hairless belt' problem should be tackled immediately.

G. A. 1. Regulations

The A.I. regulations of the Belted Galloway Society, Inc. use proof of purchase of semen as the only criteria necessary for the right to register A.I. calves. This approach encourages the owner of the A.I. sire to charge a greater than comparable commercial price for semen. The higher price discourages wide use of the semen and encourages those that do use the semen to register as many calves as possible. The incentive to register everything, and the resulting lack of selection pressure, is detrimental to both the reputation of the A.I. sire and the breed.

It is more constructive to use regulations that separate the sale of semen from the sale of the right to register resulting calves. That right can only be documented with an appropriate semen certificate available only from the breed registry and only to the owners of the A.I. sire. The owners purchase their semen certificates from the breed registry for a nominal fee and resell them at a price, and with conditions, of their choice. As a result the semen itself can be marketed at competitive commercial prices, only the best calves are registered, and the owner of the A.I. sire is protected at all times.

Also, the blood type of all A.I. sires for purebred use should be on file with the breed registry. With a 'semen certificate' approach to A.I. regulations the breed registry does not issue semen certificates for any bull without first receiving a blood type.

H. E.T. Regulations

The embryo transfer regulations of the Belted Galloway Society, Inc. lack the single most important requirement of purebred embryo transfer regulations. All calves produced by embryo transfer must be subjected to parentage verification to differentiate between planned embryo transfer calves and possible accidental natural calves of the recipient dams.

1. Age of Sire and Dam

The Belted Galloway Society, Inc. has restrictions on the minimum age of both the sire and dam of any registerable calf. A sire cannot have been younger than nine months at the time of service. A dam not younger than eighteen months at the time of calving.

The rational for a minimum age on a dam was probably to avoid 'stunting' the dam and/or producing a 'runt' calf. However, the growth of a young mother and her calf are as much a product of their nutrition and management, before and after calving, as they are of the age of the dam. Besides, any 'stunting* of the young mother will occur whether or not her calf is registerable. The rational for a minimum age on a sire is obscure. A few matings will not stunt a young bull. For both males and females early puberty is very desirable. With early puberty comes a few 'accidents'. Nothing productive is accomplished by refusing registry to any good calves that occur from those 'accidents'. It should not be the prerogative of a breed registry to dictate cattle management.

J. <u>Birthing Interval</u>

The rules of the Belted Galloway Society, Inc. state that 'a calf born less than 283 days after the birth of its dam's last previous calf shall not be eligible for registration'. Two problems:

a.) not all regular multiple births are born on the same day.
b.) the normal Belted Galloway cow has a two horned uterus capable of carrying two pregnancies of different term, one in each horn.

Both occurrences are uncommon. Neither should be justifiable reason to disbar an otherwise registerable calf from herd book entry.

2. Society Organization

Many aspects of the regulation of the Belted Galloway Society, Inc. are inappropriate. Some are uniquely inappropriate for the Belted Galloway breed. Others would be inappropriate under any circumstances for any breed. Unsuitable regulations could, in part, be a result of the 'hobbyist' factor. Few Belted Galloway breeders are cattlemen and there is a shortage of 'cow savvy' amongst the membership. However, bobbyists often make up for with enthusiasm what they lack in knowledge and, besides, any missing knowledge is available from many other sources. The lack of cattlemen among the membership, and their accompanying expertise, is itself more an effect then a cause. Better regulations would help develop better cattle. Better regulations and better cattle would attract more members who raise cattle for all or part of their livelihoods.

Inexperienced small herd owners are not the main negative influence on the regulations of the Belted Galloway Society, Inc. Two other important factors are involved:

a.) Belted Galloway breeders world wide have not given due consideration to the unique genetic limitations restricting their breed. The breeding of Belted Galloways is somewhat different from the mainstream of cattle production. The colour pattern is important. The inheritance of that colour pattern presents some problems. Without appropriate genetic consultation the Belted Galloway Society, Inc. has developed regulations that aggravate rather then alleviate those colour pattern problems.

b.) The members of the Belted Galloway Society, Inc. have no direct control over the regulations or the administration of the Society.

The Belted Galloway Society, Inc. is totally controlled by its Council. The Council is composed of nine persons. (Eight if the immediate Past President is no longer an active member of the Society.) All Council members are, in theory, elected by the membership from the membership but the Council is not responsible to the membership. Council is not obliged to consult the membership and/or take any action that reflects the wishes of the membership. The Council of the Belted Galloway Society, Inc. has the unrestricted power to determine all the regulations of the Society.

The regulations of the Belted Galloway Society, Inc. "... may be ... amended ... by a majority vote of the Council at any meeting, provided notice of the meeting shall have contained a copy of the proposed ... amendment ..." (Section XII Rules of the Belted Galloway Society, Inc.). For a Council meeting "... a majority shall constitute a quorum ..." (Article VI By-Laws of the Belted Galloway Society, Inc.). Meetings of Council "... may be called by the President, or at the request of four Council members" *(ib id.).* However, the By-Laws do not stipulate the length of time for notification or even that all Council members must be notified.

Thus the President (or four members of Council) can call a Council meeting on short notice—possibly within hours, possibly without even notifying the entire Council. Provided that a notice of proposed amendment is included in the notice of meeting, a majority vote of a quorum of the Council members could amend the regulations. A majority quorum of nine Council members is five. A majority of five Council members is three. Thus as few as three Council members can change the regulations of the Belted Galloway Society, Inc. As few as three Council members can change the regulations without notifying the membership (or possibly even all of Council). As few as three Council members can change the regulations without consulting the membership. As few as three Council members can change the regulations in ways contrary to the best interests of the breed and/or the majority wishes of the membership. Those three Council members could make changes in areas as important as the rules of eligibility for registration and conditions for transfer of ownership. This lack of membership rights and resulting lack of long term stability does not encourage significant investment in the breed.

The Belted Galloway as registered with the Belted Galloway Society, Inc. has many problems. Some are major. Some require immediate attention. All should be addressed. All can be successfully tackled given enough determination and planning by the breeders concerned. The breed has potential. Good luck!

Paper presented at 'Belties Down Under'
International Belted Galloway Conference
February, 1995