GCH++*B HALLCIENDA FROSTY MARVIN (1972-1982)

A STUDY IN LINE BREEDING

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Let's suppose you like Frosty Marvin (or any particular animal). You find a grandson to use or buy. What do you do? How much of your favored animal will you be obtaining when you purchase a grandson (or granddaughter)?

Goats have sixty (60) chromosomes, thirty (30) from each parent. Each parent also has 60 chromosomes, 30 from each grandparent. When the chromosomes in the parent go through meiosis, the 30 pairs split and randomly recombine in the fetus. Because of this, it is mathematically possible, although highly improbably, that goat **X**, with parent **A** and **B** and grandparents **M**, **N**, **O**, and **P**, could entirely miss having any chromosomes from one of his grandparents.

M (60 chromosomes)

A (60 chromosomes—probably 30 from M and 30 from N)

N (60 chromosomes)

X (60 chromosomes, 30 from A and 30 from B—probably 15 each from M, N, O, & P, but possibly any combination—including 20 each from N, O, and P, and zero from M)

O (60 chromosomes)

B (60 chromosomes—probably 30 from O and 30 from P)

P (60 chromosomes)

Now, if M is the most ideal animal in the pedigree, the one you want in the genotype (inherited genes) of X, the only sure way to make certain M is represented is to repeat that animal in the pedigree of X. This is what linebreeding is—repetition of an animal or line in a pedigree. Inbreeding is linebreeding intensified by using more closely related animals.

In the above pedigree, X is probably 50% each of A and B and possibly 25% each of M, N, O, and P. But X could also be 33.3% of N, O, and P, and zero representation of M, which means you are completely missing what you want. The only sure way to put M's genetic material in X is to inbreed or line breed. If grandparents in X's pedigree were M, N, **M**, P (instead of M, N, O, P—ie. a half-sibling breeding), grandparent M has twice the chance of being represented in X.

If grandparent M is repeated in X's pedigree, X has the chance of being anywhere from 25% M (if one M were skipped during recombination) to 50% M (if all grandparents were represented equally in X's pedigree), to almost 67% (if both M's were represented and one other grandparent were eliminated during meiotic recombination).

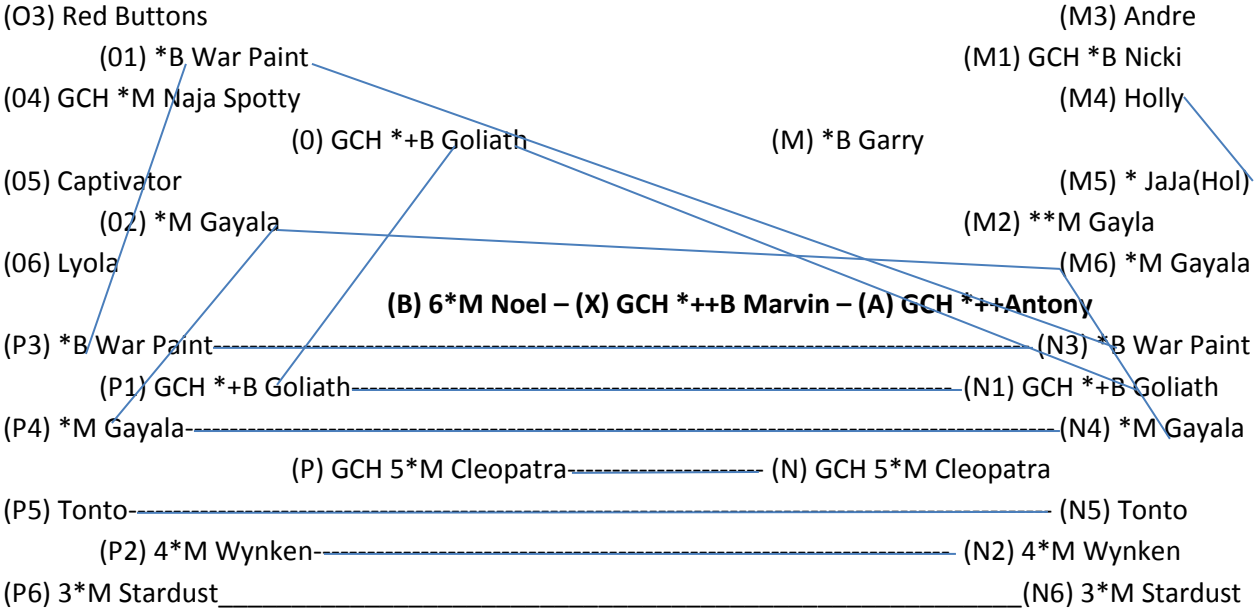
The higher the percentage of M in X's pedigree, the more to the breeder's liking, especially if M is an inbred animal, making him more homozygous (easily recognizable in offspring) and in phenotype (physical appearance). The problem is that one can never tell what percent of M is in X (except possibly through predictability testing).

Breeders who liked Marvin's potential, like his owner Barbara Thrasher, learned about linebreeding and inbreeding. For example, in the April 1986 issue of *Frosty Marvin Newsletter,* Joan Coolidge wrote that she had bred animals that had Marvin as many as 15 times in their extended pedigrees. She said she had bred three generations of daughters back to him. Each time an animal is repeated in a pedigree, the chance of him showing up in X increases.

A Marvin son or daughter is probably 50% Marvin. A Marvin offspring whose dam was also a Marvin offspring could be up to 75% Marvin. A Marvin kid, whose dam was also a Marvin daughter out of a Marvin daughter could be as much as 87.5% Marvin. I f that pattern continues for six generations, the X kid could be as much as 98% Marvin, and this is the goal of a person who believes in inbreeding.

How is such tight inbreeding on Marvin possible when it is purported that inbreeding causes lack of size, vigor, fertility, and production?

The answer lies with the early breeders who linebred on Milkeywhey Gary, Naja Goliath—Hall's Doll, Hurricane Acres Penny Royal, and Araby Royal Holly. Animals that did not meet breeders' standards were destroyed. They were not gushed over with sentimentality. They were destroyed. Animals had to maintain their substance and height (Marvin's dam was 33" at the withers, and her sire and Marvin's sire were 36"). Animals had to maintain their productivity (notice the stars in the pedigree below during a time when few herds were tested.) Animals had to meet show standards (notice the number of GCHs in the pedigree). This author prefers seeing triangles in such pedigrees.



Animals that did not meet these exacting selection standards as well as certain standards of behavior or dairy temperament were destroyed. It's not a waste. They can be eaten.

Exceptions were Tonto, who was sold young and unproven to Mexico, and Wynken, who was badly undershot, but placed well in shows. Noel's twin sister Merry had an extra teat, was named Merry TT (for triple-teats) and was sold as a backyard milker. For those reasons, it is possible to have an occasional extra teat or undershot jaw in the Marvin line. There were no frail or undersized or infertile or unproductive animals in the Marvin line. One reason for this stringent culling approach is that,

according to Holstein-Fresian estimates of heritability of traits, negative traits are more heritable than positive traits.

For instance, short stature is 4% more heritable that tall stature, a weak head is 6% more heritable than a strong head, and a weak rear udder is 8% more heritable than a strong rear udder. Overall good udders, all traits combined, were deemed 96% heritable, but poor udders, all traits combined, were figured up to 142% heritable. The most heritable positive single traits seem to be butterfat and protein percentages at 55% and good disposition at 40%.

Holly (4,254 lb. of milk at 5.7% butterfat in 402 days at age 3) didn't appear in pedigrees as often as people would have liked because one could not line breed on Holly without increasing the incidence of swollen knees in a population. So, although her progeny with swollen knees like Blackmagic's Andre Nicki, Naja Gayla, and Hallcienda Magic Garry were not culled, neither were they used in linebreeding.

Hallcienda Frosty Marvin was a highly successful inbred buck. He was 95% predictable in ability to improve offspring over dams. Of 16 Nubian bucks who qualified as both Classification Superior Sires (meaning that they sired ten or more daughters with final classification scores of 80 in ADGA or 85 in AGS or over AND as USDA Top 10% Production Sires in 1986, half were tied genetically to Marvin. One was Marvin himself, one was a Marvin son, three were double Marvin sons, one was a grandson, and two were close relatives. That same year, 34 Marvin daughters and over 200 granddaughters appeared in the USDA Top 10% Doe Summary List. In the USDA Sire Summary for milk production, 37 of Marvin's sons and 29 grandsons appeared in the top 10%. Only three Marvin sons were not represented on this list, and only one displayed a negative predictable difference in production in his progeny. That animal's sons also displayed a negative predictable difference.

Marvin's success was not accidental. It happened because early breeders, as well as later breeders, did quite a bit of judicious inbreeding. Donovan and Ethyl Beal, for example, inbred on the imported Nubian buck Milkeywhey Garry, whose picture can be seen in Stephen Considine's Power Point Pioneer presentation about the Beals on the ADGA webpage. Mikeywhey Garry showed up in the fifth generation behind Marvin three times and in the sixth generation nine times, giving Marvin an 18.75% chance of being like Milkeywhey Garry.

Other animals repeated in Marvin's pedigree from Beal's herd were GCH*+B Naja Goliath—Hall's Doll, *B Naja War Paint, GCH *M Naja Spotty, and Naja Captivator. They also outcrossed to the son of Nubian production breed leader, Joanna Price's Araby Royal Holly, a daughter of Hurricane Acres Penny Royal tested by the Doctors Dumouchel who also owned the used buck *B Black Magic's Hurricane Acres Koko Jaja (bred by Alice Tracy and owned by the Dumouchels).

Allen Fulmer (a 4-H/FFA member) also inbred on Alice Tracy's Hurricane Acres Penny Royal, who appeared in Marvin's pedigree three times in the fifth generation and three times in the sixth generation. He also used Hurricane Acres Messenger's Tonto, who was drowned in the Rio Grande on the way to Mexico.

Alice Hall brought those two lines (Naja and Hurricane Acres) together and added some more Nubian breed leader Araby Royal Holly through another son, GCH*B Black Magic's Andre Nicki (bred by the Dumouchels). To obtain Marvin, she bred GCH 5*M Hallcienda Cleopatra back to her sire, GCH*+B Naja Goliath—Hall's Doll to acquire 6*M Hallcienda Noel, who she bred to GCH *++B Hallcienda Antony, a half-brother, a Cleopatra son acquired in sort of an inbred outcross on Holly's grandson, *B Hallcienda

Garry, whose dam, Naja Gayla, was a half-sister to Goliath. This breeding, as most others at Hallcienda, was planned on paper before being executed using the kind of pedigree chart shown above for Marvin.

On paper, Alice looked for triangles, trapezoids, and other angular lines between repeated animals. She found straight horizontal or vertical lines to be less predictable, probably because that meant the animals were too closely related. Marvin's pedigree is shown above. More on this topic is in the "Breeding and Kidding" chapter of *Fundamentals of Improved Dairy Goat Management.*