NORTH AMERICAN CASHMERE GOAT
GRADING SYSTEM

Reviewed October, 2019

NACG Grading System
The North American Cashmere Goat Grading System described here reflects the North American Cashmere Goat (NACG) as a dual-purpose animal, providing both fiber and meat products, with relative market values currently defined as: FIBER 50% and CONFORMATION 50%. This ratio has been a long-held and consistent position over many years for most NACG breeders and producers. That ratio can be modified over time, however, to meet the needs of a developing NACG industry. For example, if the NACG industry requires more attention to fiber quality and production, and less attention to meat production, that ratio might in the future be changed to something like: FIBER 60% and CONFORMATION 40%.

The NACG Grading System can assign a decimal score (0-3) for each of the scoring traits of both FIBER and CONFORMATION. This system can also assign descriptive terms (Description) to these traits. A simple conversion table translates between 0-3 and Description scores:

0-3	Description
3.0	Excellent (best)
2.0	Medium (average)
1.0	Poor
0.0	Disqualified (DQ)

Note that high numbers (e.g. 2.8) are always better than low numbers (e.g. 1.8), and this is consistent across the board for all traits to be scored. In this scoring system, therefore, excellent Style would score 3.0, and poor Style would score 1.0.

The NACG Grading System can also assign an objective measurement (Data) when available. In some cases, this objective measurement is most useful in assigning value to a specific trait.
Example:

0-3	Description	Data
3.0	Excellent (best)	MFD 14.7 microns

Part 1 – FIBER SCORES

Many of the NACG FIBER traits can now be scored by using objective data obtained from computer scanning techniques and histograms. These traits can also be scored with reasonable accuracy by eye, using a 0-3 score or Description score.

Mean Fiber Diameter (MFD)

A smaller fiber measurement (in microns) is associated with a finer fiber and a softer fleece, and a better (higher) score on the 0-3 scale. MFD is most accurately determined by computer scanning, and the aggregate micron measurements are then plotted on a histogram ("MFD Histogram"). MFD can also be estimated by eye and scored in either the 0-3 or Description score columns. A conversion table can then translate between objective micron measurement (Data score) and estimates done "by eye" (Description and 0-3 scores).

There is some varied opinion around the world regarding an acceptable range for MFD in cashmere fiber. In international law and in the NACG breed standard, however,19.0 microns is the upper limit that defines North American Cashmere, and anything coarser than that is better described as "cashgora," and would not qualify as North American Cashmere.

Style

Style is another term for the "crimp" that is seen in cashmere fiber. Fine fiber (small MFD measurement) is usually associated with crimpy fiber (good Style) but not always. Most experts agree that good Style is important to the quality of a cashmere product. In some testing labs, Style can now be measured objectively by computer scanning techniques. Results are reported as "deg/mm." A very crimpy fiber would have a lot of curvature over a standardized length of fiber, expressed as more degrees of a circular arc (deg) along a measured millimeter (mm) of fiber length. A conversion table can then translate this objective Data score (deg/mm) into a Description score or 0-3 score (still using 3.0 as the best score). There currently is no specific required Style score in the NACG breed standard.

Uniformity

Cashmere down fiber should be fine, as defined by Mean Fiber Diameter (MFD), and should also have a "uniform" pattern of fiber diameter and Style, defined in this grading system as Uniformity. An objective measurement of Uniformity can be found on the MFD histogram as the Coefficient of Variation (CV) of the aggregated fiber diameter measurements and seen also in the shape of the plotted histogram curve. A "tight" curve indicates that most of the fiber diameter measurements are close to the mean, so the sample would have a small CV and the Uniformity score would be high. A "broad" curve indicates that whatever the mean fiber diameter (MFD) might be, individual fiber diameters are not uniform and differ widely from each other, so the CV would be a high number, and the Uniformity score would therefore be low. The NACG breed standard currently does require that, when plotted on the MFD histogram, the CV must be no greater than 24%.

In addition to defining the uniformity (vs variability) of the diameter of down fibers in a cashmere sample (Coefficient of Variation or CV), the Uniformity score will also be affected by the presence or absence of "transitional fibers" in a cashmere sample. These fibers show significant variability (vs uniformity) in Style as well as in fiber diameter, with transitional fiber diameters measuring somewhere between down and guard hair, usually in the 25 micron range. The plotted curve of the MFD histogram will typically show a "second spike" or will appear to be "skewed to the right" if transitional fibers are present. When examined by eye, individual fibers also appear to lose Style as they become coarser over the length of an individual fiber. In other words, part of the transitional fiber is fine and crimpy, and part of that same transitional fiber is relatively coarse and straight.

The problem with transitional fibers is that they essentially ruin the rest of the good cashmere in the product. All cashmere is "soft" when it is 19.0 microns or less, because the fine individual fibers will "bend" when they contact skin. Fibers over 20 microns, however, will not bend as easily, and are more likely to "prickle" the skin on contact. That is why transitional fibers (since they are coarser than 20 microns) are sometimes called "prickle fibers."

Summary:
Uniformity can be determined with objective measurement (Data score) from the MFD histogram, by looking at the CV of the plotted curve, and also looking for a curve that shows transitional fibers by being "skewed to the right." Uniformity can also be determined with reasonable accuracy by eye, using a small fiber sample (swatch), and looking for variability (vs uniformity) in fiber Style (crimp), since transitional fibers also lose crimp as they increase in diameter. These Uniformity scores determined "by eye" are recorded as Description or 0-3 scores. The NACG breed standard currently requires that when plotted on an MFD histogram, the CV must be 24% or less. Again, a conversion table can translate between Data, Description, and 0-3 scores.

Differentiation

Differentiation refers to the difference in diameter between guard hairs and down fibers in a given sample. Ideally, guard hair would be very coarse, and down would be very fine. If a fleece is well "differentiated" in this way, the down separates from the guard hair much more easily in the dehairing process, and more clean down is produced with less time in the dehairing machine. This translates into better quality (and longer) cashmere with less fiber damage due to breakage. But if down hair and guard hair are too similar in diameter, the dehairing machine cannot clearly tell the difference between them; the result is that either too much guard hair will go into the final product ("porcupine yarn"), or too much down will be broken and damaged or lost as waste.

Differentiation can be evaluated with reasonable accuracy by eye. Therefore, it is usually not reported on a conventional MFD histogram which usually reports diameter measurements only up to 30 microns, which will include all of the down fibers, but not the guard hairs (which are usually about 50 microns in diameter). The MFD histogram can be expanded by request, however, to include both down and guard hair fibers, and Differentiation could then be more clearly, accurately, and objectively measured in micron units. So although objective Differentiation can sometimes be available, it is rarely needed. Differentiation is currently scored as a Description or 0-3 score, and there currently is no specific Differentiation Data requirement in the NACG breed standard.

Length

Length refers to the relaxed length of the cashmere down fibers. Generally, this is simply measured with a ruler positioned next to individual fibers in a swatch sample. Length is an important FIBER trait for scoring, since short fiber tends to "pill" when made into yarn, is much more difficult to spin, and can significantly reduce the overall tensile strength of the processed yarn.

There is some varied opinion around the world regarding an acceptable range for length of cashmere fiber. In the NACG breed standard, however, 32 mm (1.25 inches) is the minimum length that defines North American Cashmere, and anything shorter than 1.25 inches would not qualify as North American Cashmere. Note that there is currently no upper limit to acceptable down length in the NACG breed standard.

Total Down Weight (TDW)

TDW refers to the Total Down Weight, or net amount (by weight) of down fibers that are obtained from any given fleece after the guard hairs (and other waste and impurities such as hay chaff, dust and dirt, etc.) have been removed by processing. TDW is also sometimes referred to as "production." Total Down Weight (TDW) can be calculated from Total Fleece weight and %Yield. With some experience, the relative % of down in the Total Fleece can generally be measured by eye with reasonable accuracy. TDW (the actual weight of the final cashmere down product) is then determined by weighing the raw Total Fleece (including guard hair and other waste and impurities), then multiplying that weight by the estimated %Yield.

Example:

A complete raw shorn Total Fleece weighs 480 grams. Estimated %Yield is 25%, which would be a typical %Yield on a shorn fleece with relatively long guard hair, or a D:G Ratio of 1:2, with minimal dirt, chaff and other impurities. So, this goat's TDW is 480 grams x 25% = 120 gram (about 4 ounces).

It is important to understand the difference between %Yield and TDW. %Yield is simply the % of useful product (down) in the raw harvested Total Fleece. So, the total weight of the raw harvested Total Fleece (including guard hair and other waste) multiplied by %Yield = Total Down Weight or TDW. Note that the method of harvest (shear vs comb) is generally the most significant factor in determining %Yield. Note also that good TDW scores can therefore come from raw fleeces with either high %Yield or

low %Yield, depending on the weight of the complete raw Total Fleece after harvest. And good TDW scores can come from goats with either a high D:G Ratio or a low D:G Ratio, depending primarily on the method of harvest – shear vs comb.

While there certainly is a strong argument for establishing a minimum TDW for the NACG breed standard, there are practical technical issues for consideration before requiring a specific qualifying score on this trait. The essential problem is that unlike other required scores for the primary required CACG traits (MFD, CV, and Length) there is no universally accepted standardized method for determining TDW that is objective enough to be practical. A value for %Yield is still required to determine TDW (%Yield x Total Fleece weight = TDW). When this %Yield value is assigned by a judge after examination of the previously harvested raw Total Fleece, that value is still necessarily somewhat inexact and uncertain, and is largely based on the experience and reliability of the judge. There currently is no widely available and reliable objective method for determining %Yield, and various cashmere processing facilities even differ on their %Yield results depending on the dehairing machinery that is used. For this reason, the CGA has decided that while 2 ounces of final cashmere product (TDW) might be a reasonable minimum for breeding goats for cashmere production, that should not yet be a specific requirement to register a goat as a North American Cashmere Goat. Until a better way is developed to assess TDW objectively and with some practical certainty, TDW is still included as a scored FIBER trait, and the NACG breed standard currently states that TDW "should be a minimum of 2 ounces." Over time, if and when a more reliable objective assessment of TDW becomes available, the expectation is that "should" will be changed to "must."

Note that even though there is not yet a required minimum for TDW, scores (with the evaluating judge identified) for this important FIBER trait may still be entered in the North American Cashmere Goat Breed Registry database.

Cover

Cover refers to the consistent distribution of quality down fiber over the four harvest sites (neck, shoulder, side, and hip) on the goat. Consistent Cover means that the cashmere that is grown at each site is of the same type and quality.

Example:

A goat might grow down on all four harvest sites, but the growth on the neck is coarser and less stylish than the down on the other sites (possibly "cashgora"), and is therefore of lesser quality than down growth at the other sites. This goat would have a low Cover score because the type and quality of the down does not show consistent quality throughout each of these four sites.

Since Cover is a trait that is important to the evaluation of the goat's ability to produce a consistent quality of cashmere fiber, it is included in this NACG Grading System as part of the FIBER score. Note that Cover scores are listed only as Description or 0-3 scores, and there is no specific qualifying score that is required in the NACG breed standard. Note also that Cover is the only FIBER trait that can only be evaluated on the live goat, and not from a single bag of harvested fleece.

Part 2 – CONFORMATION SCORES

CONFORMATION traits are based on the principle that the North American Cashmere Goat is a dual-purpose animal, producing both fiber and meat. While many of these CONFORMATION traits are certainly important to meat production, the importance of some CONFORMATION traits is not limited to the meat market. So CONFORMATION includes traits such as hooves, teeth, and reproductive organs, that might not directly increase the carcass weight or meat quality, but would certainly promote hardiness, thriftiness, and reproductive ability of the North American Cashmere Goat.

Head

North American Cashmere Goats almost always have beautiful heads and horns, and most of them score high (i.e. 3.0). There are certain horn configurations however, that are truly dangerous (i.e. 0-3 score = 0) and should prevent the goat from breeding.

One of the most dangerous horn patterns is a pair of horns that rise together steeply, then flute out to the right and left. The vertical space between the two horns forms a steep, narrow wedge that can tightly hold and break a captured leg. Another dangerous pattern is a pair of horns that flare out horizontally and widely to each side, with short upturning tips at the end of each horn. When fighting or even sparring, these goats can drive the upturned tips into an opponent's abdominal wall, and can easily rupture internal organs, particularly the rumen.

Goats with dangerous horn patterns often "know their own strength," and are often aggressive with other goats in the herd. These types of horn configuration can also be dangerous for the handlers. So here is an example of a trait that might promote the survival of the individual goat, but is dangerous enough to the rest of the herd (and even to the handlers) to prevent the goat from breeding.

Since there is currently no objective method for evaluating this trait, it is scored only in the 0-3 or Description columns, and not in the Data column.

Teeth

Good teeth are important to the health of any browsing animal, who regularly forages on very rough material. Different goat breeds have different standards for teeth, but in this NACG Grading System, the lower teeth ideally meet perfectly flush with the upper pad, and the side view shows symmetry between the upper and lower biting structures. These teeth would score high (i.e. score = 3.0 or Excellent).

Since there is currently no objective method for evaluating this trait, it is scored only in the 0-3 or Description columns, and not in the Data column.

Forequarters
This conformation trait is scored in the same way that meat goats are scored.

The ideal is a neck that is strong and well-proportioned to frame. Shoulders should be well-muscled and strong. Legs should be strong, well-muscled, and well-proportioned to frame. Shoulders, knees, and pasterns should be correctly angled and strong. Forequarter movement should be free and correct.

Since there is currently no objective method for evaluating this trait, it is scored only in the 0-3 or Description columns, and not in the Data column.

Barrel/Back
This conformation trait is scored in the same way that meat goats are scored.

The ideal is a barrel that is long, broad, and well-muscled. Chest should be wide, with ribs that are well-sprung, and with adequate girth in proportion to frame. Back should be strong and straight from shoulder to rump.

Since there is currently no objective method for evaluating this trait, it is scored only in the 0-3 or Description columns, and not in the Data column.

Hindquarters
This conformation trait is scored 0-3 or by Description in the same way that meat goats are scored.

The ideal is a rump that is broad, long, and well-muscled, with only a slight slope between hook bones and pin bones. Hind legs should be strong, well-muscled, and proportional to frame. Hips, hocks, and pasterns should be correctly angled and strong. Hindquarter movement should be free and correct.

Since there is currently no objective method for evaluating this trait, it is scored only in the 0-3 or Description columns, and not in the Data column.

Hooves
The ideal hoof has the correct size, strength, and shape to carry the weight of the animal without predisposing to injury, arthritis, hoof rot, or similar problems. It should be sturdy, broad, well-formed, and proportional to frame. Interdigital separation should be adequate to prevent hoof rot in moist conditions. Both sides of each hoof should be symmetrical and straight (not "collapsed") Here again, it is the "genetic foot" that should be judged, not management practices or trimming proficiency of the owner. Sometimes it helps to trim a foot correctly in order to better evaluate the "true" shape and size of the "genetic foot," and to score it after a trim.

Since there is currently no objective method for evaluating this trait, it is scored only in the 0-3 or Description columns, and not in the Data column.

Reproductive

Scoring here should be based strictly on function, and criteria can be straightforward and simple. Both males and females score high (3.0) as long as reproductive organs are healthy and "normal," and no significant functional deformities are present. While this might sound easy, experts sometimes disagree about what is "normal" and what is "significant" regarding deformities.

NACG Grading System:
Does:
Udder should be well-proportioned with good suspension, with two (only two) functional teats and vulva normally developed for age. Note that other breeds (e.g. Boer Goats) have applied a different standard, and some Boer breeders have actually bred for extra teats (with the associated problems).

Bucks:
Two testicles are present that are correctly sized for age. Scrotal measurements are of uncertain value. Two (only two) undeveloped teats are present. A split scrotum is a finding of uncertain significance, and until more evidence-based data is available, no points are deducted for small splits that involve 1/3 of the scrotum or less. Sheath should be normally developed for age.

Since there is currently no objective method for evaluating this trait, it is scored only in the 0-3 or Description columns, and not in the Data column.

Part 3 - GENERAL INFORMATION (no scores)

In this section, standard identifying information is recorded. This includes:

- ID, Sex, Age, Birth Date, Birth Number

Also, in this section, certain characteristics of the goat are described and recorded, but scores are not assigned. These characteristics include:

- Management issues that do not necessarily represent genetic traits.
  Examples: Condition, %Yield.
- Traits or characteristics that might be important to some breeders, but do not currently represent a consensus of NACG breeders.
  Examples: Color Down/ Color Guard Hair, D:G Ratio, Wattles, Disposition, Frame.

Cashmere Goat ID (name, ear tag number, tattoo number, microchip number, etc.).

Sex/Age/Birth Date/Birth Number (birth number: single, twin, triplet, etc.)

Color Down/Color Guard Hair (e.g. Light Brown/Black)
Note that there currently is no consensus among NACG breeders regarding the relative practical value or desirability of the various colors of down or guard hair on cashmere goats For this reason, colors of down and guard hair are listed and described here as traits under GENERAL INFORMATION, and left as a breeder preference without a value score.

D:G Ratio (Down length:Guard Hair length)
D:G Ratio describes the length of down fiber (D) compared to the length of guard hair fiber (G), and the result is expressed as a ratio. A goat with medium guard hair length, whose down fiber is the same length as the guard hair, would have a D:G Ratio of 1:1. A goat whose down fiber extends beyond the guard hair would have a D:G Ratio that is greater that 1:1 (e.g. 2:1). A goat with relatively long guard hair length, whose down fiber is shorter than the guard hair, would have a D:G ratio that is less than 1:1 (e.g. 0.5:1).
Examples:

- Goat A has medium guard hair length, and the down is the same length as the guard hair. The D:G ratio is 1:1.

- Goat B has relatively short guard hair length, and the down is twice as long as the guard hair. the D:G ration is 2:1, and the fleece could be described as an "open fleece."

- Goat C has relatively long guard hair length, and the down is half the length of the guard hair. The D:G ration is 0.5:1, and the fleece could be described as a "closed fleece."

D:G Ratio can provide useful practical information, mostly related to planning the process of harvesting the down fiber, and also to the final quality of the down fiber after processing:

- Long guard hair (a "closed fleece" with a low D:G Ratio) serves to protect the more fragile down fibers from sunlight and other environmental damage that can cause fiber breakage and shortening in the dehairing process. If a low D:G ratio fleece ("long guard hair") is to be shorn, the down might be of good quality, but a great deal of guard hair will be included in the Total Fleece weight as waste, which must then be removed at additional expense in the dehairing process. If the low D:G Ratio fleece is to be combed, however, most of the guard hair will still remain on the goat, with much less guard hair being included in the Total Fleece weight as waste.

- Short guard hair (an "open fleece" with a high D:G Ratio) usually cannot protect the fragile down as effectively as long guard hair. At the same time, if the high D:G Ratio fleece is to be shorn, there will be relatively little guard hair included as waste in the Total Fleece weight, and relatively less expense in the dehairing process.

Note that D:G Ratio is can be related to %Yield, but it is not the same thing, and that is why it is described separately. D:G Ratio is based on relative length of fiber types, not weight. %Yield is based on weight and is generally estimated from a Total Fleece that has already been harvested. (see below for more description of %Yield).

Also note that some NACG breeders prefer relatively long guard hair and some prefer relatively short guard hair. Currently there is no consensus among NACG breeders regarding the ideal D:G ratio, so the D:G Ratio is included here under GENERAL INFORMATION, and not as a trait for scoring in the NACG breed standard.

%Yield (Down weight/ Total Fleece weight)

%Yield describes the weight of down fiber compared to the weight of the Total Fleece (total raw fleece after harvest) and is expressed in %. Determination of %Yield is generally done by examination of a Total Fleece that has already been harvested. A Total Fleece with a low %Yield (e.g. 25%) would generally have a large amount of "waste" in the fleece in addition to the valuable down product. This" waste" is a combination of guard hair and foreign material such as hay chaff, dust and dirt, etc. A Total Fleece with high %Yield (e.g. 50%) would be expected to have a smaller amount of guard hair and other waste relative to the down product.

%Yield can be related to D:G Ratio, but it is not the same thing, and that is why it is described separately. While D:G Ratio is based on length, %Yield is based on weight. While D:G Ratio is easily determined on the live goat, %Yield is determined from a harvested fleece (Total Fleece). While D:G Ratio tells us only about relative fiber lengths, %Yield is affected by all types of "waste" in the harvested fleece, including hay chaff, dust and dirt, etc., as well as guard hair as "waste."

If a goat is shorn, %Yield and D:G Ratio can be closely correlated. All other factors being equal (like vegetable matter and dirt as waste), a goat with a low D:G Ratio (relatively short down/long guard hair) will produce a shorn Total Fleece with relatively low %Yield, since a large amount of guard hair will be included in the Total Fleece. If that same goat is combed, however, there will generally be little correlation between %Yield and D:G Ratio, because most of the guard hair (much of the "waste" weight in a shorn Total Fleece) stays on the goat during combing.
Example:
Assuming that the amount of vegetable matter, dust, and other foreign material is constant, a typical %Yield on a shorn fleece with long guard hair length (D:G Ratio of 1:2) might be about 25%. A typical %Yield on a combed fleece (regardless of guard hair length) might be about 50-60%.

Summary:
%Yield is defined as the % of down by weight in the harvested Total Fleece. It is included under GENERAL INFORMATION but is not given a score because it is so largely correlated to the method of harvest. %Yield is also used as part of the calculation formula for Total Down Weight (TDW), and TDW is a scored trait. For more information on Total Down Weight (TDW), see TDW under FIBER traits.

Wattles
The presence or absence of wattles is essentially a cosmetic issue that might be important to some breeders, but not to others. The presence of wattles might also have some practical significance if the goat is to be shorn (vs combed), but even then, wattles can be noted if only to be avoided during shearing. This information is therefore listed under GENERAL INFORMATION and described, but it is not a trait in the NACG breed standard that is scored.

Condition
Condition is included with GENERAL INFORMATION and is not scored as a genetic trait. Condition usually has more to do with the way the goat has been managed than it does with genetics and breeding choices. So, it is described, but not scored. Any practical effect on fleece (e.g. "hunger fine") should be reflected in FIBER scores, and any additional practical effects on carcass quality should found in CONFORMATION scores.

Disposition
It is unreasonable to try to define a universal standard ideal disposition for a North American Cashmere Goat. Disposition should ideally match the conditions under which the animal is to be raised. Quiet dispositions might be best for small herds or for animals that are frequently handled. Animals raised under open range or near-feral conditions, however, might need a disposition that is better suited to "fight or flight." And some of the behavior problems that are seen today even in some working dog breeds should teach us that disposition should not be a trait that is selected and scored primarily for the show ring.

Frame

In this grading system, Frame is simply defined as the overall size of the animal, and does not indicate the "shape" or conformation of the animal. Note that Frame is often (but not always) correlated with live body weight. If live body weight is measured on a weight scale, adjustments would need to be made for the Condition of the animal when trying to determine an objective measurement of Frame. If Frame were to be determined from live body weight, it would need to be measured as "ideal body weight" as it would be with the goat in ideal Condition.

Example:

A goat might weigh 180 lbs. on the scale, and that weight can be recorded as "live body weight." If the goat is obese, however (noted under Condition), live body weight would not be closely correlated with "ideal body weight" – i.e. what the goat would weigh if it were in proper good Condition. So while "ideal body weight" might most accurately reflect the true "genetic frame" of the goat, objective measurement of this trait is currently too imprecise to be scored.

Note also that there currently is no consensus among NACG breeders regarding the relative practical value or desirability of goats with either small or large Frames. Some breeders simply prefer large goats, and some prefer smaller goats. For this reason, and because the process of assigning a score is so variable, Frame is estimated and described here as a trait under GENERAL INFORMATION, and any perceived value is left as a breeder preference without a formal score.