

On-Farm Performance Testing for Meat Goat Doe Herds

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Defining On-Farm Performance Testing

Performance testing is the comparative evaluation of goats for production traits of economic importance: reproduction, growth, and carcass merit. Ancestry (pedigree) and visual appraisal for conformation (appearance) have been the primary basis of animal selection in meat goat herds. Most resource inputs (i.e., herd expenses) go into doe management. In return, does are expected to become pregnant, deliver live newborns, and raise multiple kids with good growth to weaning. Reproduction is generally viewed as the most important trait of meat animal production. Reproductive output in a meat goat herd is defined as litter weight weaned per doe exposed to the buck. On-farm performance testing includes the comparative evaluation of does for reproductive output, the evaluation of individual kids for weight gain, and in multi-sire breeding programs, herd sire comparisons for progeny performance.

Objective, accurate recording of doe herd performance allows producers to make better selection and culling decisions and to measure performance responses to management changes. Producers can assess the production return (i.e., litter weight weaned) from the expenses incurred for doe management.

Conducting an On-Farm Performance Test

Performance records should be easy to use. They can be handwritten records in a notebook or on index cards. Each animal in the breeding herd should have a separate record. Alternatively, records can be maintained electronically on computer spreadsheets or herd management software. Electronic records allow

easy handling of data for analysis or transfer to central processing centers such as industry organizations or universities, particularly for herds with large sets of data accumulated over several years. However, a hand calculator and a little time are all that may be required for processing data from smaller herds using handwritten records. Under any scenario, proper record keeping is essential to a successful performance testing program.

Animal identification. A prerequisite to performance testing is proper identification (ID) of animals. Ear tags and tattoos are the most common forms of ID for meat goats. Assign each herd member a unique and permanent ID number. Assign ID numbers to kids at birth when collecting early data such as birth weights, litter sizes, and neonatal deaths. Newborn kid data need to be matched with the correct doe. In herds with many does kidding together on pasture or range, it can sometimes be a challenge to tell which kids belong to which does. Rejected kids, early newborn deaths, and the occasional swapping of kids by does make it important to properly and adequately ID kids soon after birth, preferably within 24 hours.

Scales. Scales represent another requirement of a performance testing program. Body weight is undeniably important as a measure of meat animal performance as well as for some aspects of general herd management. A small hand-held scale is sufficient to record birth weights. A larger livestock scale is needed for weaning weights. Scales may be bought, borrowed, or rented depending on the needs and resources of individual operations. A scale should be periodically checked to ensure that it is accurate and precise when weighing animals.

Contemporary Groups. A contemporary group is a set of meat goat kids born and raised together under uniform conditions. Performance testing for genetic evaluation requires factors like age, nutrition, and location to be equal for all kids. Kids in a contemporary group are born within a 60-day period and managed together from birth to weaning. Dams should also be managed similarly to weaning. Data from kids born outside the 60-day window or managed differently (e.g., on show circuit, bottle babies, kept in separate pastures) are excluded from the group. Contemporary groups for kids weaned at three months old are planned 8-10 months earlier at the start of breeding. A breeding season no longer than 6 to 7 weeks assures that kids will be within the 60-day age range at weaning.



Performance Recording

Body Weight. Primary traits to record in a meat goat herd are the number of kids born and weaned for each doe exposed to bucks, kid weight at birth and weaning, and dam weight at weaning. Birth weight is the starting point to determine preweaning growth rate. Recording birth weight also facilitates recording the birth date, identification of the dam, and tagging the

newborn with a unique ID number. Record the weights of newborns within 24 hours of birth.

Record weaning weights at about 90 days of age. Weaning weights are usually recorded on one calendar date for a group of kids that vary in ages. The ages within a contemporary group of kids at weaning should deviate from 90 days by no more than 28 days. It is also useful to weigh the dams when the kids are weaned. Dam weights are used to calculate doe efficiency.

Litter Size. For each doe exposed to the buck, record the number of live births and the number of kids weaned. Note a stillborn in a doe's file, but do use them for litter size and they need not be weighed. Artificially-raised kids are not credited to the dam for weaning litter size or weight. In cases when a doe adopts a kid from another doe, the adopted kid can be credited to the 'foster' dam for weaning data. Failure to birth or wean a kid following buck exposure is recorded as zero (0) for the doe.

Animal Evaluations

Kid Evaluation. Weight comparisons can be biased at weaning because ages vary in a contemporary group. A 79-day-old kid cannot be expected to weigh as much as a 114-day-old kid. Therefore, each weaning weight (wwt) is converted to a 90-day standard. Two equations are used to generate 90-day weights. First calculate average daily gain (ADG):

$$\text{ADG} = (\text{wwt} - \text{birth wt}) / \text{weaning age}.$$

After the average daily gain is determined, the second equation gives the 90-day weight:

$$90 \text{ day weight} = (\text{ADG} \times 90) + \text{birth wt}.$$

When birth weight is not available, ADG cannot be determined. In the absence of birth weight records, the previous equations can be replaced with the following equation based on weight per day of age:

$$90 \text{ day wt} = (\text{wwt} / \text{weaning age}) \times 90.$$

Adjustments are made to 90-day weights because litter size and age of dam affect weaning weight. Weaning weights generally decrease as litter size increases and young does wean lighter kids than mature does. Multiply 90-day weights by the applicable correction values (Table 1) to adjust weights. Bucklings are usually heavier than doelings, but sex adjustments are not needed because comparisons are made within single-sex groups. Buck kids are compared only to other bucklings and doe kids only to other doelings.

Table 1. Correction values for adjusting 90-day meat goat kid weaning weights

<i>Effect</i>	<i>Group</i>	<i>Value</i>
Litter Size <i>born & weaned</i>	1 & 1	1.00
	1 & 2	1.14
	2 & 1	1.04
	2 & 2	1.18
	3 & 1	1.08
	3 & 2	1.23
Age of Dam <i>years</i>	1	1.10
	2	1.09
	3+	1.00
Sex of Kid	Buck	1.00
	Doe	1.11
	Wether	1.03

Values courtesy of David R. Notter, Ph.D., Virginia Tech

An additional step is generating weight ratios. Within each sex group, individual kid adjusted weights are compared to the group average to produce ratios for evaluation. The ratio shows the deviation of a kid 90-day adjusted weight (adj wt) from 90-day adjusted weight average (adj avg) of the group. The 90-day weight ratio is calculated as follows:

$$90 \text{ day wt ratio} = (90 \text{ day kid adj wt} / 90 \text{ day group adj avg}) \times 100.$$

A ratio of 100 is equal to the group average. A kid with a weight ratio of 122 is 22% heavier than the group average. Conversely, a kid with a ratio of 84 is 16% lighter than the group average.

Sire Evaluation. In herds using multiple sires, kid weights and ratios can be used to compare sires for progeny performance if each kid's sire is known. Buck and doe kid ratios may be combined for sire evaluations. Adjusting doe kids to a buck kid weight equivalent (Table 1) is done to combine buck and doe kid weight records for sire evaluation.

Doe Evaluation. For each dam, add the weights of all kids she weaned. Actual or 90-day weights can be used for doe evaluations. Actual weights are preferred because they credit the ability of does to breed early and raise kids for a longer period of time, weaning off more weight on average compared to does bred later in the season. When comparing young and mature does, correct kid weights for age of dam (Table 1). A sex of kid correction can also be made to put doe kids on a buck kid weight equivalent for unbiased litter weight evaluation. Litter size corrections are not made to kid weights for doe evaluation. Zero (0) is recorded for litter weight weaned of does not weaning a kid.

Litter size at birth and weaning should be assessed for each doe. After two or three production years, a certain average number of kids weaned by does should be expected such as 1.5 kids weaned per buck exposure.

Doe production efficiency can be measured by how much total litter weight a dam is able to wean relative to her own body weight. A heavier doe (e.g., 150 pounds) tends to require more management inputs than a lighter doe (e.g., 100 pounds). However, the heavier doe may or may not be able to convert the greater inputs into a correspondingly heavier litter weaning weight. The following equation provides the efficiency of doe production:

$$\text{doe production efficiency} = (\text{litter wwt} / \text{dam wt at weaning}) \times 100.$$

Nutritional resources are used by does for self-maintenance, reproduction to produce kids, and milk production to raise kids. In young does, growth must also be supported. Forage and feed inputs may be available in limited or unlimited supply to does and usually represent the primary expense of herd management. Doe production efficiency values vary widely, ranging from less than 50% to over 100%. Does with consistently higher production efficiency values within a given set of environmental/management conditions are considered better converters of management resource inputs to marketable litter weight weaned; these does are more efficient, profitable herd members.



Recording Other Important Traits

Other production-related traits may be of interest to meat goat producers. Growth rates after weaning can be evaluated on-farm when goats are retained to heavier post-weaning market weights or when developing replacement breeding stock. Keep detailed health records on each animal in the herd. A periodic evaluation of records is recommended for traits associated with internal parasitism, lameness, abortions, mortalities and other health concerns to help in making selection and culling decisions and reviewing various herd management procedures. Although the primary focus has been on performance testing for preweaning kid growth and doe reproductive output, animal evaluation for other economically important performance traits is encouraged in meat goat herds.

Summary

On-farm performance testing of the doe herd is important in crossbred, commercial meat goat operations expecting good doe-kid performance with minimal management inputs. On-farm performance testing is important in purebred, seedstock operations that expect to provide genetics to commercial meat goat producers. Each producer will set specific performance levels for animal selection and culling decisions. Performance records, when used with visual appraisal and pedigree, facilitate genetic improvement for economically important traits. Performance records allow for the evaluation of management procedures and how changes in herd management affect animal performance. Performance records, when coupled with financial records, provide the basis of assessing the economic status of an operation and the likelihood of making a profit or incurring a loss from year to year. Performance and financial targets should provide direction to breeding programs. On-farm performance testing helps to achieve herd goals.

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