

A Deviation Chart for Evaluating Heifer Growth

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Summary

Optimal growth rate for dairy heifers has been defined as the rate that will allow heifers to develop to their lactation potential at the desired age and with minimum expense.³ Animals that follow a normal growth curve are likely to be more healthy, and grown at lower cost, than animals whose growth deviates from the normal curve. This paper describes a computer program, (readily available to veterinarians as "shareware") that can be used to compare animals in a herd to growth standards. The program plots the deviation of each animal's measured height and weight from standards for an animal of the same bred and age. A representative sample (25% or more) of heifers from a farm should be measured and charted. The chart produced is an efficient screen for problems in youngstock management. Frequently particular husbandry problems will be suggested by characteristic patterns of abnormal growth.

Heifer growth charts have been used in various ways for many years. Computerization saves a great deal of time and effort in plotting points on paper as well as greatly decreasing the chances for errors in plotting points. The deviation chart format emphasizes problems while minimizing clutter. The program will run on IBM-compatible microcomputers running MS-DOS or PC-DOS without additional software and is configurable to use either Metric or English units.

Introduction

It has been shown that suboptimal growth is not economically sound as it increases costs involved in raising heifers as well as increasing average age at first calving.^{2,4} It has also been well demonstrated that abnormally rapid growth is detrimental to lactation performance.^{5,6} "Heifer Growth Charts" have been in use for a number of years to help monitor and optimize youngstock growth. They generally consist of a double-scale graph with separate curves representing normal growth in weight and normal growth in height (Figure 1). Normal growth may be indicated by either a line or a shaded area between two lines indicating a normal range as is done in Figure 1. Each individual heifer is plotted on the sheet as a pair of

points representing weight and height and the resulting double scatter diagram is analyzed. There is no intrinsic link between points for height and weight of an individual and plotting errors are always a possibility.

We hoped to design a computer program that would make data entry fast and easy while minimizing the chance of errors. We also wanted to produce a report that was easy to read and printable on any computer's printer.

Availability of the Computer Program

"Heifer Growth Analyzer (C)", is a computer written by one of the authors.¹ Version 2.2 is described in this paper. Members of the AABP are permitted to copy the program freely and distribute copies to other veterinarians or their dairy clients, though a small registration fee is solicited from satisfied users. AABP members get a copy by sending \$10 (to cover handling) to Dairy Vet Software, RD 1, Argyle, NY 12809.

The program will run on IBM-compatible computers with 512 K RAM. There is very extensive built-in help available from within the program. It should only be used by, or under the supervision of, a qualified consultant who is familiar with many variables and conditions involved in heifer growth.

Growth Standards

Growth rates of heifers in experimental herds were used to establish growth standards reported in the past 30 years. Many current experiments show higher growth rates than these standards and it has been suggested that these heifer growth rates established at an experiment station may be biased by the unique management or genetic lines on the respective farm. The applicability of a standard for growth developed in one herd and used in another herd depends on the similarity between herds in respect to conditions that affect initial weight (genetics and maternal environment) as well as rates of growth.⁷

Growth standards used in this computer program are based on measurements from 163 commercial Holstein dairy herds from late 1984 through early 1985.² These standards are somewhat larger than those found previously by USDA experiment stations.



Name Sample Herd
 Date 1-1-89
 County _____

Calf and Heifer Growth Chart

Holstein

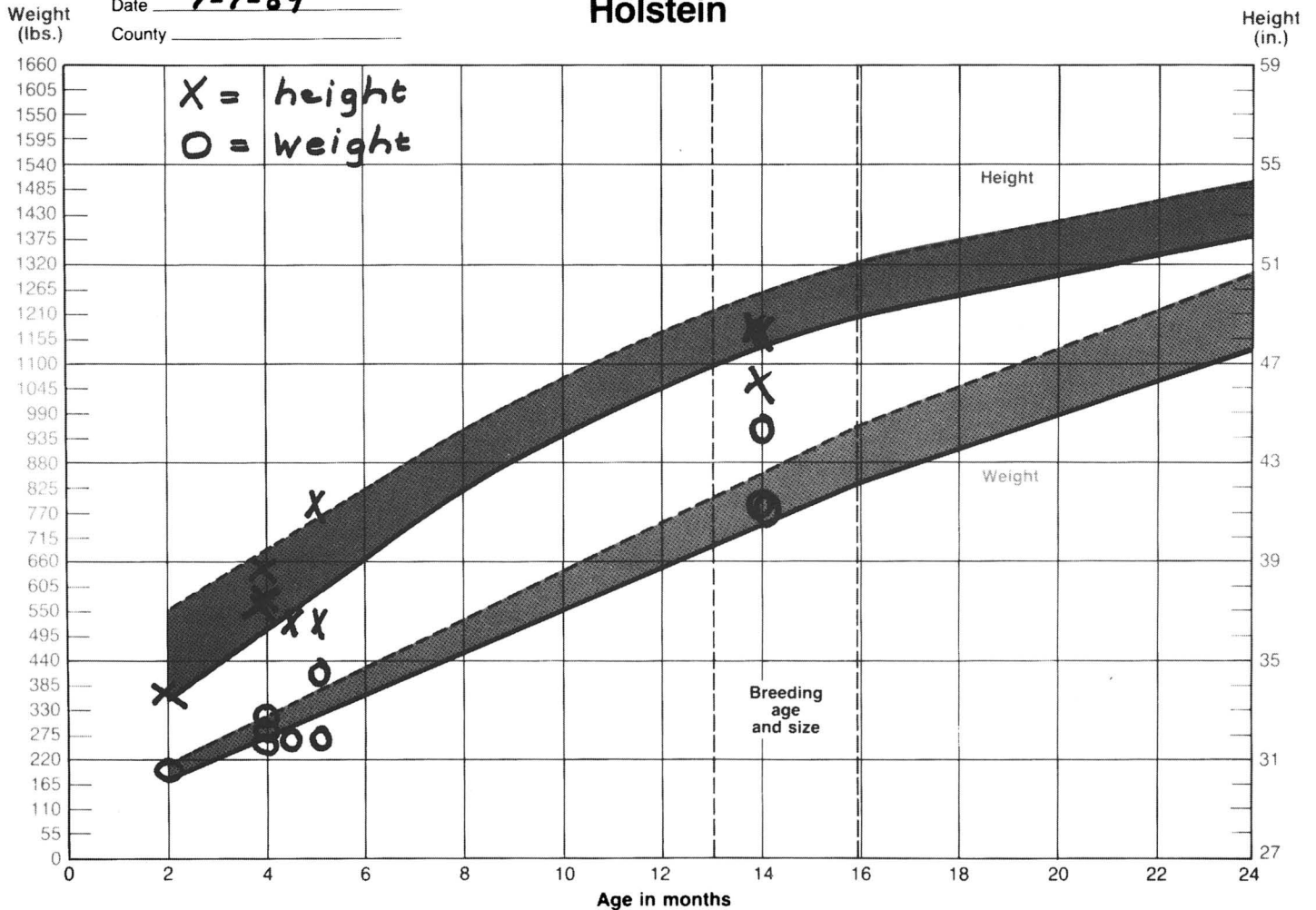


FIGURE 1. Calf and Heifer Growth Chart.

The Chart

A properly designed graph emphasizes useful information while minimizing distracting elements. We are asking the question "Is the group of heifers growing at the optimal rate?" If they are not, we also want to see clues to the cause of the abnormal growth.

Our chart does this in several ways. Figure 2 is an example, displaying the same data as are shown in Figure 1. First the animals are sorted by age with the youngest animals at the top and the oldest at the bottom. Each heifer is represented by one horizontal bar made up of "+" or "-" marks representing the percent deviation from normal height. Another bar is printed representing deviation from normal weight. Finally there is a column for body condition score.⁸

For each animal the computer calculates breed-specific normal height and weight ranges for the specified age. If measured values fall within these ranges there are no marks on the bar graphs. Note that the third and fourth animals [Lo-normal, Hi-normal] on the chart differ by over forty pounds in weight but both fall within the normal range. If measured height or weight is below the lower limit for "normal", a string of "-" marks, proportional to the magnitude of the deviation, is printed on the left of the center marker. Similarly, "+" marks are printed to the right of center if the measured value is greater than the top of the normal range. Note, for example, that the third and fifth animals have exactly the same height and weight, but "SlowGrow" is half a month older than "Lo-normal," so is small for her age. At normal sensitivity a single mark will be printed for each five

Sample Herd
Measured 01/01/89

WT/HT (Lb.In)	AGE (Mo.)	NAME	BREED	WEIGHT FOR AGE ____:____	HEIGHT FOR AGE ____:____	CONDITION SCORE
300,37	4.0	Normal-2	H	:	:	3.0
272,37	4.0	Lo-normal	H	:	:	3.0
315.38	4.0	Hi-normal	H	:	:	3.0
272,37	4.5	SlowGrow	H	--:	--:	
272,37	5.0	VerySlow	H	---:	--:	3.0
400,41	5.0	FastGrow	H	:++	:++	
800,48	14.0	Normal-3	H	:	:	
950,48	4.0	OverFat	H	:++	:	3.5
800,46	4.0	Shorty	H	:	--:	3.0

Each - or + represents
plus or minus 5%.

Each - or + represents
plus or minus 2%.

Heifers average 5 pounds (1%) heavier than normal on 9 heifers and 0.3 inches (11%) shorter than normal on 9 heifers. Body condition scores average 3.1 on 6 heifers (%) heavier than normal on 9 heifers and 0.3 inches (11%) shorter than normal on 9 heifers. Body condition scores average 3.1 on 6 heifers.

FIGURE 2. Heifer Growth Analyzer

percent deviation in weight or two percent in height. The sensitivity can easily be changed by the user, in which case the legend below the graphs will be adjusted automatically. There is a verbal summary including averages printed at the bottom.

Interpretation

The graph (Figure 2) emphasizes deviation from normal. By definition, a completely normal herd will show no minuses or pluses left or right of the colons which represent normal weight and height. Patterns of deviation may correspond to problems in husbandry. Often these are repeated among heifers that are in the same age range. Group deviations are likely the result of improper feeding or management of heifers for a certain time period or age range. For example, heifers that are fed a ration that is high in energy but low in protein may have normal or high weight but sub-normal height and high condition scores. Many conditions in which protein, energy, and ration balance are ill-aligned will cause poor growth. Chronic parasitism or other chronic disease may produce heifers that are sub-normal in height, weight, and condition score.

Herds with animals genetically larger or smaller than the standard used may appear high or low even with good management. Often these genetic differences are overshadowed due to management by two months of age,

and do not show up again until the animal has reached maturity.

Since heifers are listed on the chart in order of age it is sometimes possible to pinpoint management problems. For example, the top half of the chart may look good and the bottom terrible in a herd with poor calf management that leaves older heifers to fend for themselves on poor pasture. We also may see compensatory gains in herds with poor calf management that feed an excellent ration to older heifers. Scattered individuals that deviate from the general pattern may have specific problems such as chronic pneumonia. Because individuals can be identified by name or number, it is possible to check back on animals that stand out. In any situation, monitoring heifer growth is an effective method of evaluating a replacement program which might otherwise be overlooked.

References

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PRACTICE TIP

Organizing the Production Medicine Program

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Key to the success of an production medicine program is organization, and that organization begins with the scheduling of on-the-farm visits. Two key points to consider relevant to the schedule are:

1. When the management visits will take place, and
2. How the scheduled date of the visit is communicated to the client so that the veterinarian and the producer are properly prepared for the visit.

A second point to consider relevant to organization of the program is a schedule of events that:

1. Identifies what areas of the management program will be addressed during the visit and
2. What management areas have been previously reviewed, the date of those reviews, and what areas will need to be addressed in the future.

Setting Up the Management Schedule

The idea is to keep it regular, organized, simple and easy to remember for both the producer and the practitioner.

Step 1 is to make copies of the next 2–3 months of a blank calendar. The dates are then filled in with the clients' names, designating the date and times of the scheduled visits.

Step 2 is to convey to clients when their visit is scheduled. During a visit to the farm, "red stickers" are placed on the clients' barn calendar, clearly identifying for the client the date of future herd visits. These stickers are placed on the calendar for 2–3 months in advance.

This simple procedure serves as a daily reminder to the client of the time and date of the next visit. If changes need to be made, a simple phone call by either party is used to cancel or change the date. This is the only time phone calls are needed.

Schedule of Events to be Reviewed

In a comprehensive dairy management program, there are many areas that need constant attention while other aspects of the program require only occasional supervisory guidance and checking. The problem is devising a system that reminds you and the producer of what areas of the program have been reviewed and when, and what management areas will be due for review in the future.

A spreadsheet is set up for 12 months in advance. Management areas to be reviewed are listed down the first left hand column. Months are listed across the top of the page. "Red Dots" are placed in the appropriate square, denoting when a given management practice will be given attention. When that management practice has been dealt with, a "Green Check" is entered, signifying completion of the task. This page is the first page in the client folder. Therefore, each month when the client folder is opened, you are greeted immediately with a picture of what has and has not been done. It keeps the program on track, avoids neglecting critical areas too long, and helps you to prepare better for the next months' visit.

To be effective, production medicine skills and knowledge should be delivered in an organized and systematic manner. These ideas have been presented with that thought in mind.