HERD GAME - A "HANDS ON" COMPUTER APPROACH TO TEACHING BREEDING PRINCIPLES FOR DAIRY FARMERS

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BACKGROUND:

Some time ago Andrew Gallagher (Senior Dairy Extension Officer, Maffra, Victoria) gave a talk at an HIOV Conference in which he outlined some possible consequences of different culling and breeding selection policies for a research farm in his district. He was beset by farmers afterwards with "what if we do this" questions that illustrated that many found this form of enquiry stimulating, and also that many did not fully understand the principles involved in making these policy decisions. Concern had also been expressed that farmers had little or no understanding of the variability that is actually involved in breeding.

I undertook to write a computer simulation program (HERD GAME) to address these issues. Computer simulation is being used increasingly on the farm and the success of various programs available (e.g. feed budgeting and financial management packages) indicates that farmers should have no problems in using this medium for educational/ management purposes as long as the programs are well written and easy to use (i.e. "user friendly"). HERD GAME allows farmers to try out a variety of options or different policies in response to on screen prompts, and by comparison of the results obtained, effectively illustrates the principles underlying those decisions. It is envisaged that in the not too distant future farmers on micro computers will be able to access their own herd recording, insemination, breeding and mastitis records for use in programs such as HERD GAME. Using an example herd, HERD GAME could also be an effective tool for extension officers in a discussion group format.

THE PROGRAM

As a basis for the areas the program should address we asked a group of farmers in the Maffra district for a list of the questions they must answer in making decisions about which cows to cull, which cows and which bulls to select for breeding. I used these questions to determine the format of the program.

CULLING DECISIONS

This unit calculates predicted production for next year as a measure of the success of various culling policies. Farmers can alter the priority they place on different traits, the level of culling for those traits (culling criterion) and the replacement rate. Any of these elements can be changed repetitively, all options tried are stored for comparison at the end of the unit. The concepts of averages, standard deviations and distributions are also explained.

COW SELECTION

After a discussion of the theories of ABV's, the consequences of different policies for cow selection for breeding are expressed in the predicted average ABV of the calf crops generated.

The unit looks at:

- The effect of culling on the predicted calf crop.
- The effect of altering the proportion of the herd mated to AI and the proportion of the herd that is allowed to contribute to the calf crop (random vs. non random mating).
- What the effects are of including heifers to mate to AI.

BULL SELECTION

This unit examines:

- The effect of using bulls of different genetic merit (ABV) and different reliabilities.
- How to minimise the risk involved in bull selection.
- The effect of using progeny test semen in the herd.
- The effect of selection for one trait on other production traits.

AN EXAMPLE

Consider a farmer who is faced with a team of bulls from which to select semen. To his/her dismay, some of these new bulls have great ABV's but low reliabilities. To make the correct decisions about which bulls to breed from he/she must understand the principles of reliability and of how to minimise the effects of low reliability.

To approach this problem, after an explanation of what reliabilities are, the farmer is asked to choose 2 bulls of the same genetic merit but widely different reliabilities from the list of the top 50 ABV sires with semen available.

e.g. He might choose HECTOR; fat ABV +30, reliability 95%
and RASTUS; fat ABV +30, reliability 65%

If the average of his cows is 0 then the average calf ABV is expected to be +15. The effect of reliability can be shown by graphing the distribution of the true average breeding value of the calves. Figure 1 shows these graphs.

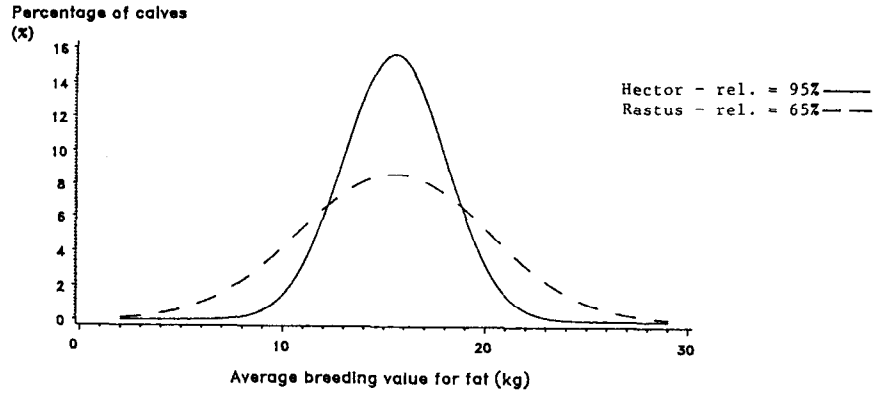

FIGURE 1: Distribution of true average breeding value for the 2 bulls HECTOR and RASTUS.

A bull's ABV may differ from his true breeding value because only a limited number of daughters are used to calculate the ABV. Therefore the average true breeding value of his daughters may be higher or lower than predicted using ABV's.

The risk involved in using bulls of low reliability (65%) can be minimised by using several bulls. Figure 2 shows the effect of using five bulls of the same reliability and ABV as the bull RASTUS (reliability = 65%).

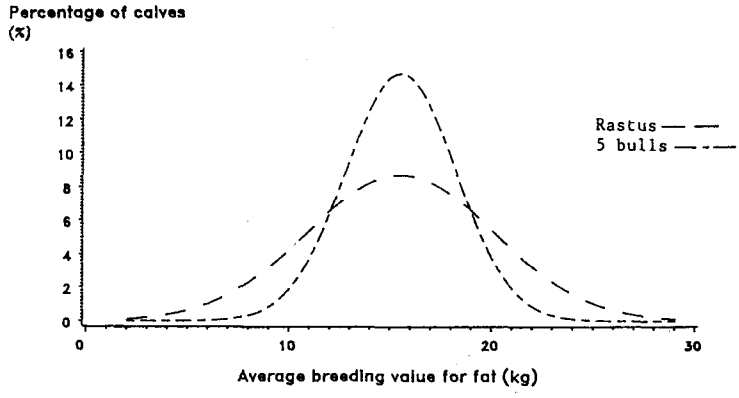

FIGURE 2: Distribution of true average breeding value for 5 bulls versus 1 bull of reliability = 65%.