

PREDICTING FORAGE PRODUCTION FROM PASTURE BY USE OF THE DELPHI TECHNIQUE

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ABSTRACT

The objective of this study was to determine the effect of various pasture management techniques on the predicted yield of forage from pasture. Twelve researchers, extension and industry personnel in Atlantic Canada participated in the Delphi technique as well as the Conjoint analysis to arrive at estimates for the yield response expected from the use of single pasture management techniques and multiple combinations of the same. The results of the Delphi survey demonstrated that all of the pasture management techniques would increase the yield of forage, from seven percent up to forty-seven percent beyond the yield of unimproved, unmanaged pasture.

KEYWORDS

Delphi technique, pasture management

INTRODUCTION

The "Summer-Fall Slump Project" is an epidemiologic study designed to investigate the farm-to-farm variation in the seasonal pattern in test day milk production per cow found among Prince Edward Island dairy herds, as recorded in the Animal Productivity and Health Information Network (Dohoo and Ruegg, 1993; Hovingh *et al.*, 1997). Forty-five herds that experienced a significant decline in production during the summer and fall months were selected for inclusion in the study as were forty-five herds that maintained consistent production. The selected herds were visited to gather information about many factors, including the feeding programs and feed quality. Since the majority of the herds utilized pasture as a significant feed source, it was expected that the availability of pasture forage would play a significant role in the level of milk production during the summer and fall months. Therefore, detailed information was obtained concerning the management practices applied to each pasture field of each farm. Sward height measurements were also taken from all pasture fields during the 1994 summer visit.

The Delphi technique seeks input from a panel of experts when there are no objective estimates readily available or when the opinions of a single expert are not deemed acceptable (Weinstein and Fineberg, 1980). It was used to summarize the opinions of twelve regional pasture and forage experts about the effect of various management techniques on pasture productivity. These estimates were required to generate models to predict the seasonal milk production pattern on a farm based on the pasture management practices utilized.

MATERIALS AND METHODS

Twelve regional pasture and forage experts in Atlantic Canada were sent a letter requesting their participation. The participants were sent a list of pasture management techniques and asked to estimate, for each technique, the amount of change in herbage production which would be expected if it was used on a Prince Edward Island dairy farm that had used no pasture management practices in the past. The results of their initial estimates were tabulated and returned to the participants without identification of the respondents. Opportunity was then given for each participant to modify their estimates based on the answers given by the other respondents.

Comments from participants were solicited to allow for explanation or questioning of the values chosen, and these were also returned to the group. The moderator provided clarification when this was

required. The whole process was repeated four times, at which time it was decided that the answers had stabilized to the point where further change was unlikely to occur.

RESULTS AND DISCUSSION

In nearly all cases there was a move to less variation in the answers as the technique progressed (Figure 1). The average value also changed quite noticeably for some techniques (eg. rotational grazing), whereas others were quite stable throughout (eg. lime application). Table 1 provides the final estimates of the predicted yield response for the pasture management techniques used in this Delphi exercise. The final point estimates obtained by this Delphi technique will be used to calculate the total feed theoretically available from the pasture on each farm. This will allow comparison of the farms on the basis of the amount of herbage available to the cows during the grazing season.

The Delphi technique is termed a "compositional technique" in that the effect of combinations of factors must be composed from the individual estimates. This is in contrast to Conjoint analysis which is termed a "decompositional technique". Conjoint analysis involves obtaining estimates of different combinations of factors and "decomposing" the results to arrive at estimates of the individual factors. In general the results of a conjoint analysis are expected to more accurately reflect the impact of the individual factors (Horst *et al.*, 1996). The participants of the Delphi technique are participating in a conjoint analysis exercise and the results of this effort will be reported at the Congress.

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Table 1

Results of a Delphi Survey of pasture and forage experts in Atlantic Canada.

Pasture Management Technique	Average Percent Increase in Yield	Standard Deviation
Rotational grazing with fixed paddocks	35.8	11.3
Forward strip grazing (no followup fence)	22.7	8.1
“True” strip grazing	46.7	16.3
Lime application (within last 5 years)	11.3	3.1
Manure - light application (within last 2 years)	10.8	2.0
Manure - medium application (within last 2 years)	17.9	2.6
Manure - heavy application (within last 2 years)	25.8	4.2
Fertilizer - 15-15-15 (one application in the spring)	21.9	4.1
Fertilizer - 30-0-0 (one application in the spring)	18.3	2.5
Fertilizer - 15-15-15 (two or more applications)	32.5	7.8
Fertilizer - 30-0-0 (two or more applications)	27.5	5.0
Pasture clipped as needed	7.7	4.5
Pasture reseeded 1-2 years ago	27.9	7.2
Pasture reseeded 5-10 years ago	7.1	5.8

Figure 1

Average and standard deviation of estimates for two techniques over four iterations of the Delphi Survey.

