ECONOMIC EVALUATION O
THE MILK GROWTH HORM

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The purpose of this paper is to discuss developmen
(BST) with respect to profitability at farm level.
appropriateness as technology is increased by the
conducted previously. On-farm response trials at
conducted amongst existing users of BST provided
The model and procedures of analysis are flexible
Results indicated that, given the conditions of rese
to improve profitability of certain dairy businesse
apart from management, are the milk price, respon
have a negative effect on profitability of BST.

1. INTRODUCTION

The purpose of this paper is to discuss developmen
use of procedures to evaluate application of B
Somatotropin (BST) with respect to profitability at
level. Supplemental application of synthet
produced BST has the ability to increase
production in dairy herds. Although BST has
adopted by some farmers in South Africa and a
since 1994, it remains a controversial prod
Commercial utilisation has not yet been approved
European Union and in South Africa some milk b
have publicly voiced strong objections against
while others are in favor of it. Also, economi
management implications of BST utilisation hav
previously been studied under South African condi
causing uncertainty regarding its appropriatene
technology to enhance profitability.

Section 2 explains the method of research, follow
results and conclusions in Section 3 and an epilog
Section 4.

2. METHOD OF RESEARCH

Research consisted of three parts, of which detail
be obtained from Du Plessis (1996). *Firstly*, a pe
telephonic survey was conducted amongst existing
of BST in order to collect data to be used in eco
analysis, as well as to scrutinize manag
implications of BST utilisation in practice. *Sec*
on-farm BST response trials were performed at
case study sites, the purpose of which was to dete
increase in milk production as a result of
application under specific farming conditions and a
gather data for economic analysis. *Thirdly*, an eco
and management simulation model was develope
used to examine the impact of BST on milk produ
feed consumption and profitability of dairy enter
under conditions of which the research was conduc

The research was limited to specific conditi
Geographically it was restricted to the Free
province, and then also to farmers who adhere to
average management practices and produce rela
high milk yields[1] (although this category of farme
in minority, they are responsible for the largest sh

Bethlehem (eastern Free State). Two of the farmers farmed with Holstein animals and one with Ayrshires. None of the farmers applied BST previously. Herd size varied between 133 and 56 cows in milk, average milk yield between 7 734 and 8 920 kilograms per cow over 300 days and inter calving period between 396 and 423 days. All three made use of total mixed rations with four different feeding groups, one being cows in first lactation and the others based on yield differences amongst second and later lactating cows. Rations were fed on *ad lib* basis, so that feed intake could increase when milk production increased. Cows were moved to the next feeding group when milk yield increased above a certain level, so that more concentrated rations in terms of energy and protein were available with higher levels of production.

Feeding practices were particularly important determinants in case study selection, because feeding requirements increase when milk production increases as a result of BST application. According to Peel and Bauman (1987), BST treated cows compare to genetically superior animals of similar production levels, while genetic differences are mainly accounted for through feed intake and regulation of nutrients. As a result, a vital part of the case study research comprised analysis of individual feed components, ration composition and intake levels, to confirm that feeding were according to NRC (1988) recommendations. Annex B of Du Plessis (1996) contains details of all three aspects for each case study, where it was shown that feeding practices were in accordance with NRC standards.

BST response trials at each case study site consisted of selecting control and treatment groups, BST treatment of the latter, recording of milk yields and processing of results. The first two aspects receive further attention. In order to select control and treatment groups, pregnant cows in health, going into second or higher lactation with condition scoring at least 2,5 (Wildman et al, 1982) and no visual deficiencies to udders or legs, were selected. These criteria correspond to recommendations made by manufacturers of BST (Twigge, 1994). There were proceeded to divide selected cows into two groups with comparable age, production potential and days in milk, after which a treatment group were randomly chosen. Treatment groups were treated four times (every 14 days) with *Lactatropin*™ over a period of eight weeks, while detailed records were noted. Apart from BST application, animals of both groups were treated according to normal farming practices.

2.3 Model development and procedures of profitability analysis

Although the model was primarily used to determine the influence of BST on decision variables, it was developed to be flexible and could be used for a wide range of economic analysis. It may be described as a functional, time step dynamic, Monte Carlo simulation model that may either be operated on deterministic or stochastic basis[2]. The model was developed on spreadsheet and stochastic appliance involves risk analysis with aid of @Risk add-in. Input to the model include initial herd composition and herd flow parameters (such as mortality and conception rates), feed ration composition, feed intake, group composition

provide a basis for sensitivity analysis. Use
or 20 percent intervals around expected v
instead, makes sensitivity analysis worth
less.

- The detrimental effects of risk analysis by "
force" are beyond speculation. In other v
selecting too many variables to be stochastic
paying sufficient attention to probal
distributions, haphazard use
normal/triangular/uniform distributions and
ignore dependency between variables, will do
harm than good.

Analysis was extended to study the effect of
production quotas. Six strategies, refle
combinations of BST application levels and sal
productive dairy cows, were evaluated under diff
quota levels (Du Plessis, 1996: 73-78).

3. RESULTS AND CONCLUSIONS

3.1 Most important findings revealed by su

Nine of the ten respondents farmed with Holst
while one farmed with Ayrshires. Herd size v
between 55 and 400 cows in milk (average 186),
between 6 300 and 11 000 kilogram milk per cow
300 days (average 8 000) and inter calving p
between 372 and 430 days (average 400).

With regard to *feeding*, all the respondents empl
total mixed rations as feeding system and they
emphasised quality of roughage and balanced ratio
preconditions for successful milk production.
respondents had more than one feeding group, while
fed the same ration to all of his cows. All o
respondents said that feeding requirements of
treated cows were similar as that of untreated cow
the same level of milk production. This is in har
with findings of Chalupa and Galligan (1989).

With regard to *application* of BST, it was concl
that respondents generally adhered to recommenda
of manufacturers of BST.

With regard to *animal health* and *reproduction*, s
respondents indicated that BST had no influenc
health. Three indicated that BST treated ani
experienced a slight tendency to be more pron
disease, but no more than untreated animals on si
production levels. According to all respondents,
calving period depends on timing of application - v
BST is applied after pregnancy, no influence
experienced apart from the fact that inter calving p
of treated cows compared with those of untreated
on similar production levels. These results corresp
with findings of Bauman (1992) and Phillips (1982)

Table 1: Average increase in average milk produ

	Case A
Average	4,29
Standard deviation	1,57
- 95% interval	3,87
+ 95% interval	4,71

* Average kilogram milk per cow per day over a two

Table 2: Financial ratio analysis of BST utilisation

	Cas
Feed cost as % of gross income:	
Without BST	67,7
With BST	65,4
Production cost as % of gross income:	
Without BST	81,8
With BST	80,3
Profitability ratio:*	
Without BST	21,2
With BST	23,9
Cash inflow as % of cash outflow:	
Without BST	11
With BST	11

* Gross margin as percentage of total capital employed in

production as a consequence of BST application. It furthermore indicated that within the context of research, chances that use of BST would not be profitable, were insignificant. Break even points for all four of these critical variables were comfortably outside predetermined minimum/maximum limits (break even was defined to be the point where profitability with BST treatment equalled profitability in absence of BST).

Also, even when the price of milk and response milk yield were simultaneously pinned at their minimum values, while cost of BST and feed were set to their maximum values, use of BST still lead to improved profitability. This means that sensitivity analysis indicated that no further risk analysis was needed to investigate profitability of BST under circumstances of research. However, Monte Carlo simulation analysis was performed by Du Plessis (1996) to illustrate capabilities of the model. In doing this, values of the four critical values were derived from probability distributions, while other variables were fixed at expected values.

3.4 Impact of milk production quotas on profitability of BST utilisation

It was found that BST utilisation was profitable in situations where quotas were introduced, albeit less profitable than in situations where no quotas applied. This result corresponds with findings of Giesen, Oskam and Berentsen (1989). Optimum management strategies in view of quotas depended on the specific (especially cash flow) situation of business, time period of quota and choice indicator (for example profitability versus cash flow). In general, the most profitable strategy was to manipulate BST and sale of lactating cows in such a way that milk production approached the upper limits of quota.

4. EPILOGUE

A computer spreadsheet model was developed and used to evaluate profitability of BST use under specific local conditions. On-farm response trials at three representative case study sites and a personal telephonic survey conducted amongst existing users of BST provided a valuable basis to develop and apply the model. The model and procedures of analysis are flexible and could be applied to other problems of dairy farm management. Results indicated that, given the

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