

# Determinants of the cost of days open in dairy cattle

De Vries, A.

Department of Animal Sciences, University of Florida, Gainesville 32611, USA

## Abstract

Greater days from calving to conception (days open) is typically associated with reduced profitability in dairy cows. This reduction is partly caused by determinants such as increased risk of culling, and reduced milk production. Objective of this study was to describe the determinants of cost of extra days open for various pregnancy rates. The optimization and simulation model DairyVIP (<http://dairy.ifas.ufl.edu/tools>) was used to optimize breeding and culling decisions for individual cows based on input parameters such as lactation curves, pregnancy rates, and prices that represent typical conditions in the USA. Herd statistics, for example average days open and profit per cow, were calculated by Markov chains. Pregnancy rates were decreased from 36% to 9%, resulting in average days open increasing from 112 to 166. Cost per extra day open varied from \$3.19 to \$5.41 per cow per year. The major cost determinant was heifer purchase cost, ranging from an increase of \$2.11 to \$7.46 per cow per year for each extra day open. Size of the individual determinants and their relative contribution was greatly dependent on average days open.

## Introduction

An increase in the number of days between calving and conception, also known as days open, is typically associated with reduced profitability in dairy cows. This reduction is partly caused by factors such as increased breeding cost, increased risk of culling and replacement costs, and reduced milk production. The value of daughter pregnancy rate in the USA, a genetic measure of fertility, assumes a \$1.50 cost per extra day open excluding the cost of increased culling (De Vries, 2005). On the other hand, some epidemiological studies have incorrectly accounted for cull cost twice, by using published cost per day open and then again adding the cost of culling. Objective of this study was to describe the determinants of cost of extra days open for various pregnancy rates.

## Materials and Methods

The optimization and simulation model DairyVIP (<http://dairy.ifas.ufl.edu/tools>) was used to optimize breeding and culling decisions for individual cows based on inputs such as lactation curves, service rates, conception rates, and prices that represent typical conditions in the USA. The default service rate was 50% and the default conception rate was 40%. Pregnancy rates, calculated at service rates  $\times$  conception rates, were varied from 9% to 36% with simultaneous increments of 3 percentage units in both service rate and conception rate. Herd statistics, for example average days open, revenues, costs, and profit per cow per year, were calculated by Markov chains (De Vries, 2004). Costs per extra day open were calculated as the difference in profit per cow per year divided by the difference in average days open between runs at different pregnancy rates.

## Results

Average days open in the herd decreased from 166 to 112 and profit per cow per year increased from \$97 to \$337 when pregnancy rates increased from 9% to 36% (Figure 1A). The cost per extra day open ( $\Delta$  profit /  $\Delta$  average days open) varied from \$3.19 to \$5.41 (Figure 1B). Cull rates decreased from 47% to 32%.

The major cost determinant was heifer purchase cost, ranging from an increase of \$2.11 to \$7.46 per cow per year for each extra day open (Figure 2). Secondly, changes in milk sales ranged from an increase of \$0.51 to a decrease of \$1.24 per extra day open. Cow sales increased from \$0.80 to

\$2.20 per extra day open and calf sales decreased from -\$0.43 to -\$0.23 per extra day open. Breeding cost and labour costs were also greater at greater days open. Feed costs varied with milk sales.

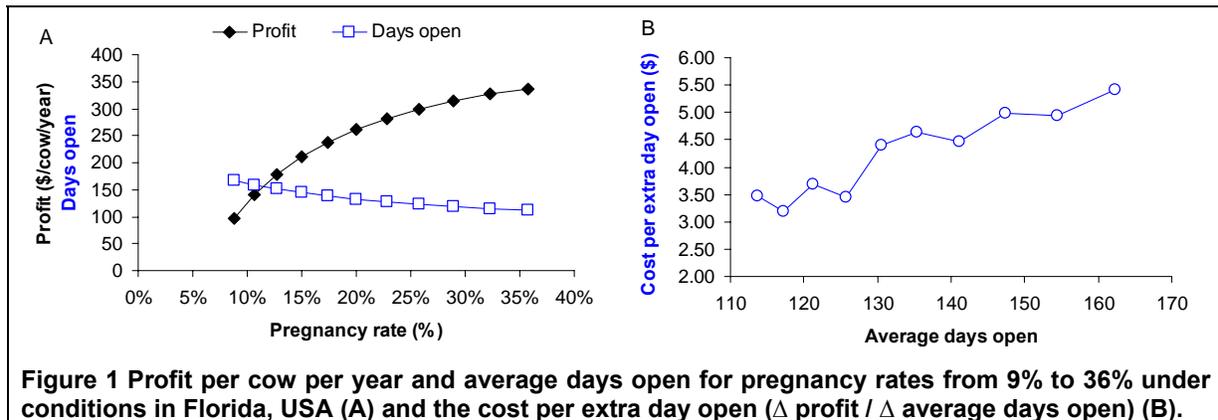


Figure 1 Profit per cow per year and average days open for pregnancy rates from 9% to 36% under conditions in Florida, USA (A) and the cost per extra day open ( $\Delta$  profit /  $\Delta$  average days open) (B).

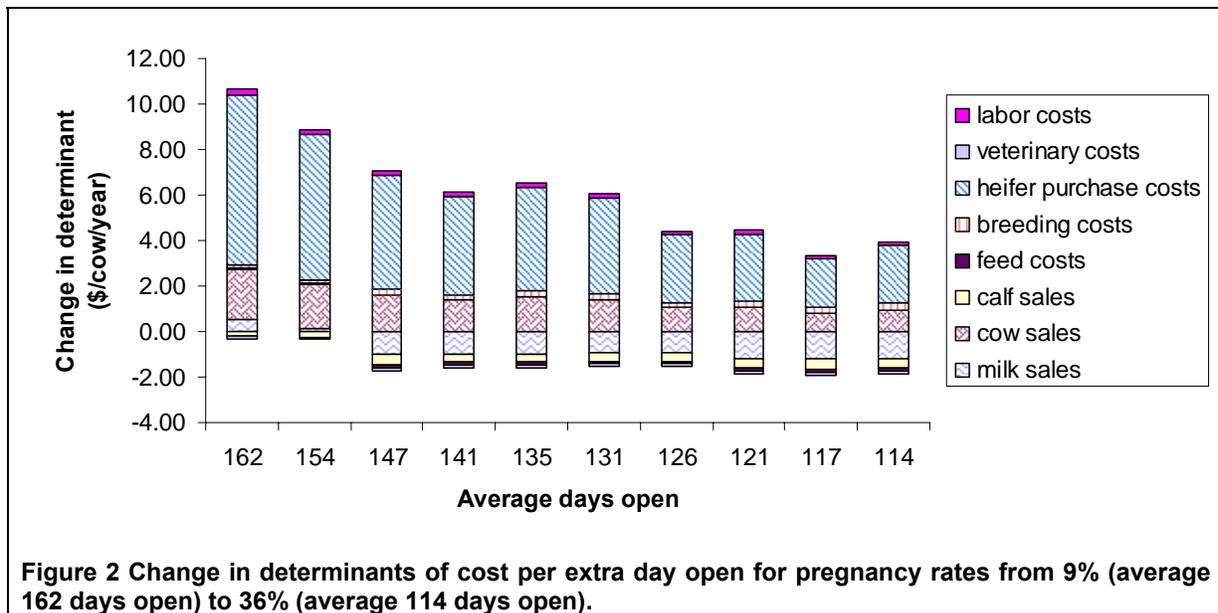


Figure 2 Change in determinants of cost per extra day open for pregnancy rates from 9% (average 162 days open) to 36% (average 114 days open).

## Discussion

Size of the individual determinants and their relative contribution was greatly dependent on average days open in the herd. Heifer purchase costs and cow sales were major determinants of the cost per extra day open. Costs per extra day open for individual cows could be significantly different from average cost for the herd, however.

## References

De Vries, A. (2004) Economics of delayed replacement when cow performance is seasonal. *Journal of Dairy Science* 87, 2947-2958.

De Vries, A. (2005) Economic importance of genetic improvements in milk production, reproduction, and productive life. *University of Florida Extension Publication AN158*. Available on <http://edis.ifas.ufl.edu/AN158>.