Associations between data derived KPI’s and gross margin in Welsh and English beef suckler herds

# Application

Key performance indicators of beef suckler production can be used to predict the gross margin of both lowland and less favoured area suckler herds in Wales and England.

# Introduction

# Key performance indicators (KPI’s) within livestock production systems can be used to inform both production and financial efficiency and aid on-farm decision making (Jones et al., 2021). This is done by collecting data on farm, calculating the KPI, and benchmarking to determine year on year performance or compare with industry recommendations. A recent report by Huang et al., (2022) highlighted that nearly half of the farms in their study were underperforming when they conducted a KPI review with farms scoring highly on KPI’s tending to score highly on business resilience. While farming systems can be very diverse, gross margin offers the ability to measure the gross income less the variable costs on an enterprise basis. Therefore, the aim of the present study was to analyse data from the Farm Business Survey (FBS) and determine the relationship between calculated KPI’s and gross margin per head of suckler cows in two different farming system types, lowland and LFA.

# Materials and Methods

# Data was extracted from FBS which is the annual stratified survey of farms ran by Aberystwyth University in Wales and the Department for Environment, Food and Rural Affairs in England. After searching the literature for key performance indicators used to describe suckler cow performance, data was extracted for the year 2021-2022 using MATLAB from survey results and ten key performance indicators were calculated as described below. A total of 130 lowland and 315 LFA suckler farms were used for the data analysis. The FBS defines LFA or Lowland as holdings where grazing livestock account for two thirds of their total standard output.

# Data quality was checked using histograms and qq plots. Farms with multiple key performance indicators missing were removed and data was also tested for normal distribution. Statistical analysis was conducted using RStudio and forward and backward stepwise linear regression was conducted. Possible predictors of the gross margin out of the following independent variables on a per cow basis; Vet & Med (£), Variable Cost (£), Concentrates (£), Gross Margin(£), Forage Area (ha), Calf Mortality (%), Grazing units, Cow to Bull Ratio, Total calves, Cow Mortality (%), Replacement Rate (%).

# Results

Average gross margin per head for Lowland sucklers was £256.20 and £284.98 for LFA suckler systems. Key performance indicators significantly associated with gross margin per head of suckler cows were cow mortality, variable costs, vet and med, concentrates and forage area with R2 = 0.4183 and 0.6125 for LFA and Lowland farms, respectively.

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| --- | --- |
|  | Changes in mean gross margin (£) given one unit change in KPI  |
| KPI | LFA |  | Lowland |  |
| Variable Costs per cow, (£) | -0.6160 | \*\*\* | -0.51442 | \*\*\* |
| Cow Mortality, % | -12.1437 | \*\* | -15.45502 | \*\*\* |
| Replacement Rate, % | -2.9926 | \* |  | ns |
| Vet and Med per cow, (£) |  | ns | 0.05405 | \*\*\* |
| Concentrates per cow, (£) |  | ns | 1.03706 | \*\*\* |
| Forage Area per cow |  | ns | 67.15824 | \* |
| Total calves per cow |  | ns | -68.85293 | . |

**Table 1**. Results of the stepwise regression. Significance of coefficients: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 or ‘ns’ not significant

# Conclusions

# This data analysis has shown that on- farm livestock performance measured through KPI’s can be used to predict the gross margin of suckler cow enterprises. The results can be used to illustrate and emphasise the financial gain farmers could achieve by measuring and benchmarking the performance of their suckler herd. Further work is needed to investigate which KPI’s are going to be most advantageous in relation to production system type.

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# References

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Jones, A., Takahashi, T., Fleming, H., Griffith, B., Harris, P. and Lee, M., 2021. Quantifying the value of on-farm measurements to inform the selection of key performance indicators for livestock production systems. *Scientific reports*, *11*(1), p.16874.