



## Implementation of a performance indicators system in a beef cattle company

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**ABSTRACT** - It was aimed to propose a methodology for implementing a performance indicator system in a beef cattle company. Strategic goals and prioritization of process previously performed in the company was used as a support to the implementation. Possible indicators were listed and confronted with occasional restraints to its implementation and further analyzed by the Balanced Score Card (BSC) point of view. Subsequently, indicators were individually analyzed and their relationship with the company's strategic goals was determined. Seventeen indicators were selected, two under financial perspective, nine under process perspective, four under customer perspective, and two under development and learning perspective. The relationship analysis showed that the indicators support appropriate monitoring of the critical processes to achieve the strategic goals, thereby consolidating the management system.

Key Words: environment analysis, management system

## Implantação de um sistema de indicadores de desempenho em empresa de pecuária de corte

**RESUMO** - Objetivou-se neste trabalho propor uma metodologia para implantação de um sistema de indicadores de desempenho para empresas de pecuária de corte. Foram utilizados como suporte à implementação os objetivos estratégicos e a priorização de processos previamente realizados na empresa. Os possíveis indicadores foram listados e confrontados com as eventuais restrições à implantação e posteriormente analisados pela óptica do Balanced Score Card (BSC). Na sequência, procedeu-se à análise individual dos indicadores escolhidos e de seu relacionamento com os objetivos estratégicos da empresa. Foram selecionados 17 indicadores, dois financeiros, nove de processos, quatro dos clientes e dois de aprendizado e crescimento. Evidenciou-se, pela análise de relacionamento, que os indicadores permitem adequado monitoramento dos processos críticos para atingir os objetivos estratégicos consolidando o sistema de gestão.

Palavras-chave: análise de ambiente, sistema de gestão

### Introduction

The survival of beef cattle companies in the current competitive environment is increasingly challenging. Nowadays, these companies seek to continuously improve their results, and performance measurement is the best tool to support this action, driving the company to success if these measurements are taken. Also, their focus have changed in the last few years evolving from a mere accounting-financial control to the monitoring of non-financial items. These items are critical for the business if we consider that decisions should be made during the process, and not only at the end of it, when results – good or poor – have been already established.

Martins (1999) states that many companies, trying to survive, privilege changes in production technology rather

than in the management system, which usually evolve at different paces. In the best scenario, this results in sub-optimization of investments made in production.

Bond (2002) believes that performance measurement is key in management, because performance is partially a result of the taken decisions, in which quality is affected both by the quantity and the quality of the information generated by indicators.

According to Müller (2003), performance indicators depend on the strategy as a starting point and require processes as a substrate for establishing the indicators. That author emphasizes this interdependence: if there is no strategy, how can processes be prioritized or indicators defined? If there are no indicators, how can the strategic plan be followed and process improvements be maintained? And, if there are no processes, how can organizational

efficiency effectively be achieved as each strategic goal can hardly be met by a function? This proposed model is called MEIO – Strategy, Indicators, and Operation Model, after the acronym Modelo de Estratégia, Indicadores e Operações in Portuguese.

This study aimed at applying a methodology for indicator in a beef cattle company as a complement of a previous determination of strategic objectives and critical processes to aid the management system of this kind of company in the search for higher market competitiveness.

### Material and Methods

A study of case was carried out in April, 2007, on Estância Guatambu, located in Dom Pedrito, RS, Brazil, at BR 293 highway, km 263. Guatambu is a family-owned company that works with intensive beef cattle and crop production, employing cutting-edge technology in both businesses. It has an area of 10.000 ha (around 25,000 acres), distributed in five production units. Polled Hereford and Braford cattle are produced under a complete production cycle system, including breeding, calf rearing, finishing, and production of sires.

The company had previously determined its strategic goals and the critical processes required to achieve them. The applied methodology and the results of this process are described in Rosado Jr. & Lobato (2009). The authors used as tools to facilitate and to guide the process, the analysis of “Five Competitive Forces” by Porter (1989) to analyze the external environment, and the SWOT matrix (Bicho & Batista, 2006) simultaneously for external and internal analyses. Processes were prioritized relative to the proposed strategic goals by comparing the main company processes with their estimated impact on each of the proposed goals.

Based on the findings by Rosado Jr. & Lobato (2009), and working with the company management team, possible indicators, capable of monitoring the processes previously defined as critical, were listed. The following relevant characteristics of an indicator, as mentioned by GIL (1992), were considered:

a) To reproduce the vision of the customer, allowing quality checking as perceived by the consumer. These indicators must show how the product is being used at its final destination, and how it fits in the value chain of the customer;

b) To indicate the level of input utilization, making it possible to determine the occupation of the productive capacity of organization and the definition of the best product mix, that is, how much and when to produce some

products to make the best use of production inputs. These indicators are calculated as the ratio between production capacity and its level of use;

c) To be sensitive to process changes in order to indicate if products are being manufactured within the planned specifications or if the production process was improved, requiring the tolerance range to be narrowed;

d) To be objective and easily measurable. An indicator is objective when it shows to those following its deviation losses or gain, quality or defect levels;

e) To provide timely answers. This means the capacity of an indicator to provide answers before the process which it measures generates losses to the organization;

f) To be close to where the problem may occur, that is, to be readily available to those that need to take decisions on the process.

During the next step, restrictions and requirements for the establishment of indicators were listed to be weighted in a critical analysis that would appoint the most adequate indicators. Restrictions are the main difficulties and hindrances for the adoption of an indicator under evaluation that need to be weighted against their possible contribution for the achievement of the strategic goals of the organization (Kiyon, 2001).

The approved indicators were grouped according to the BSC - balanced score card (Kaplan & Norton, 1993). This model tries to balance indicators in order to make them a whole, showing the different sides of the business that need to be managed by combining financial and non-financial measurements. It recommends indicators according to the following perspectives: financial, customer, internal processes, and learning and development. The financial perspective represents the long-term goals of the company, i.e., to generate higher returns regarded to the invested capital. From the customer perspective, the company performance in the market segment that it intends to compete in is monitored. Regarded to the internal processes, measurements are chosen to leverage excellence in processes that are critical to put forward the established strategy. Under the perspective of learning and growth, the aim is to establish the necessary structure to support the objectives defined by the internal processes, such as employee training, information technology systems, etc.

The chosen indicators were then individually analyzed, describing the operational details and their main parameters (Kiyon, 2001). The “person responsible for the indicator” was defined as the employee who is responsible for collecting data to generate value and to monitor performance, taking actions that are decided together with those defined

as “audience”, that is, those interested in the results. Goals were determined taking into account the current level of process performance to make them realistic and achievable. The target challenge was determined by considering the possibilities of improvement in the short/long term, encouraging the team to exceed the expected results. In addition, generation frequency, which defines the verification interval, and review frequency, which indicates maximal time limit to review the indicator parameter, were determined.

A complementary and extremely important action to validate the implementation work was the graphic representation of the analysis of relation among indicators, and their alignment with the organization goals to check the level of adhesion in order to ensure that the system is focused in showing that the critical requirements are being met.

### Results and Discussion

Based on the analysis of the internal and external environment, the company defined strategic goals for macroprocesses and processes considered as critical (Rosado Jr. & Lobato, 2009). The goal of the macroprocess sire production was to increase traded volume, maintaining sales price. The goals of the macroprocess production of

finishers was to increase the participation of the company in higher-value niche markets by producing cattle that meet the requirements of these markets as to age, carcass weight, and finishing, as well as to increase productivity (kg beef/ha). The goals of the human resources process were to improve the skills of operational personnel, and to reduce lesions caused by repeated strain.

The crossing between processes and strategic goals revealed (Table 1), using subjective evaluation, the impact of the performance of each process on the established goals, which allowed priority to monitor processes.

The indicators considered as essential by the management team were then confronted with the possible restrictions to their use (Table 2), particularly by taking into account the difficulty of obtaining data for the generation of the indicator, and its contribution for the management system. The indicator is “approved” when this relation is positive.

The analysis of possible restrictions showed that none of them made the adoption of the selected indicators unfeasible, as the required data are easy or moderately easily to obtain, with no need of major organizational and/or structural changes in the company.

Indicator analysis according to balanced scored card determined that the principles of the methodology

Table 1 - Impact of processes on the strategic goals of the organization

Processes	Macroprocess				
	Production of sires	Production of finishers		Human resources	
	Strategic goals				
	Increasing marketed volume maintaining sales prices	Increasing the participation in higher-value niche markets	Increasing productivity (kg/ha)	Increasing level of skills of operational personnel	Reducing repetition strain lesions
Natural pasture supply	high	low	high	low	
Cultivated pasture supply	high	high	high	low	
Supplementation	interm.	interm.	interm.	interm.	
Feedlot	low	high	high	interm.	
Manufacturing of concentrated feed	low	interm.	interm.	interm.	
Silage production	low	interm.	high	interm.	
Breeding	interm.	interm.	high	high	
Gestation	interm.	interm.	high	high	
Calving	interm.	interm.	high	high	
Lactation	interm.	interm.	high	high	
Weaning	interm.	interm.	high	high	
Rearing	high	high	high	interm.	
Selection	high	interm.	interm.	low	
Sire preparation and sales	high			interm.	
Finishing		high	high	interm.	
Marketing	high	high	low		
Health control	high	high	high	interm.	
Field operations	high	high	high	high	high
Production control	high	high	high	high	

Source: Adapted from Rosado Jr. & Lobato (2009).

of Kaplan & Norton (1993) are complied, that is, that all perspectives proposed by the method are considered, generating a broad view of the organization, capable to support decisions and to leverage the process of continuous improvement (Table 3). Process indicators were predominant, suggesting a significant concern with ensuring results at the operational level of the company.

When the chosen indicators were individually analyzed, the operational details and the main parameters required to their implementation and system update were specified (Tables 4 to 12).

Soil fertility is considered as strategical by the management team because it is the main production factor and because its preservation/evolution is directly related to the sustainability of the production system over time. It

Table 2 - Analysis of the restrictions of proposed indicators

Indicator	Restrictions
Soil fertility bank	Need to analyze individual areas (paddocks)
Percentage of cattle marketed according to specifications of the customers	Need to clearly determine specifications for each lot sold
Percentage of cattle marketed in niche markets	No restrictions
Cow body condition score (BCS) at calving and at weaning	Requires trained personnel and criteria standardization
Productivity (kg/ha/year)	No restrictions
Pregnancy rate	No restrictions
Weaning rate	No restrictions
Mortality rate	No restrictions
Sire target weight at 6, 18, and 24 months of age	No restrictions
Awards in breed contests	Judging criteria are very variable
General satisfaction of sire customers	No restrictions
Percentage of retention of sire customers	Lack of consistency in sire purchase by farmers
Percentage of new customers	No restrictions
Training hours per employee	No restrictions
Leave of absence, days	No restrictions
Gross margin per ha	Does not consider depreciation
Gross margin per sire	Difficult to separate costs

Table 3 - Distribution of indicators of Estância Guatambu according to balanced scored card perspectives

Perspective	Indicator
Financial	Gross margin per ha Gross margin per sire
Processes	Soil fertility bank Percentage of cattle marketed in niche markets Productivity (kg/ha/year) Cow body condition score at calving and weaning Pregnancy rate Weaning rate General herd mortality rate Sire target weight at 6, 18, and 24 months of age Awards in breed contests
Customer	Percentage of cattle marketed according to the customer's specifications General satisfaction of sire customers Percentage of retention of sire customers Percentage of new sire customers
Learning and development	Training hours per employee Leave of absence, days

is based on the correction of soil nutrient deficiencies in each farm subdivision, as well as the replacement of elements exported in the marketed products, thereby maintaining adequate substrate (no severe restrictions) for plant production.

Complying to specifications of the customer for the product "finishers" primarily requires the clear identification of the needs and requirements of each customer – which are usually considerably different – to guide workers in selecting animals to be marketed. Another important factor is the skill of these workers in identifying animals that comply to those requirements, as this is a visual task, with no aid of equipment such as ultrasound, which makes finishing determination easy and objective. Finishing, determined as subcutaneous fat depth (mm), is considered by the company one of the most important factors of satisfaction of the customers.

Cow body condition score is one of the most reliable indicators of the reproductive performance and production efficiency of breeding cattle (Pötter & Lobato, 2004). Thus, the management team decided to use this indicator as it has

Table 4 - Analysis of the indicators “soil fertility bank” and “percentage of animals marketed according to specifications of the customer”

Title	Soil fertility bank	Percentage of cattle marketed according to the customer's specifications
Formula	(number paddocks classified as “intermediate” for P, K, and OM, according to ROLAS / total number paddocks) * 100	(number approved animals / total number sold animals) * 100
Measurement unit	Percentage	Percentage
Goal	60%	> 90%
Challenge target	80%	95%
Person/people in charge	Agronomist	Veterinarian
What does he/she do??	He/she shows the evolution of the assumed soil fertility	He/she monitors the macroprocess production of finishers and the precision of the selection of animals to be sold
Benefits	It monitors the basic substrate for feed production	It is directly related to satisfaction of the customer
Related process	Feed production	Production of finishers
Information generation frequency	Biannual	Monthly
Review frequency	Biannual	Annual

one of the best cost/benefit ratios in beef cattle production because it is easy to be used, and markedly contributes for the success of this activity. It is directly linked to the indicators “pregnancy rate” and “weaning rate.”

The indicator “Sire target weight at 6, 18, and 24 months of age” was chosen because it is highly correlated with the presentation of the sires at auctions being significantly valued by the customers of the company and it is considered by them as an indicator of the maximum genetic potential of the sires. The goals were determined because the current predominant biotype in the herd achieves good finishing at these body weights, despite of the small individual variations that are common in large herds due to genetic variability.

Awards in breed contests in official cattle shows are considered an important marketing strategy, and they are used by some associations of breeders to establish rankings of genetic-producing companies, despite of the subjective and empirical character of the selection of the best animals in this type of event.

Table 5 - Analysis of the indicators “productivity (kg/ha/year)” and “cow body condition at calving and weaning”

Title	Productivity (kg/ha/year)	Cow body condition at calving and weaning
Formula	(kg sold finishers + kg sold sires) / number used ha	Average of the assessments
Measurement unit	kilograms per hectare	Body condition score – 1 to 5
Goal	> 200	> 3.5
Challenge target	220	4
Person/people in charge	Veterinarian	Veterinarian
What does he/she do??	He/she shows the productivity per utilized area	He/she indicates breeding herd nutritional status at strategic times of the cycle
Benefits	It monitors the macroprocess “production of finishers”	It predicts reproductive performance, allowing timely nutritional corrections
Related process	Production of finishers; production of sires	Production of calves
Information generation frequency	Annual	Twice a year: at calving and at weaning
Review frequency	Annual	Annual

Table 6 - Analysis of the indicators “pregnancy rate” and “weaning rate”

Title	Pregnancy rate	Weaning rate
Formula	(sum of pregnant cows / sum of cows exposed to breeding) * 100	(sum of weaned calves / sum of cows exposed to breeding) * 100
Measurement unit	Percentage	Percentage
Goal	> 90	> 80
Challenge target	95	85
Person/people in charge	Veterinarian	Veterinarian
What does he /she do??	He/she shows the efficacy of natural breeding and artificial insemination processes	He/she shows the efficiency of the process “production of calves”
Benefits	It correlates nutritional and health status with reproduction techniques	It encompasses the performance of several processes
Related process	Production of calves	Production of calves
Information generation frequency	Annual	Annual
Review frequency	Annual	Annual

Table 7 - Analysis of the indicators “general herd mortality rate” and “sire target weight at 6, 18, and 24 months of age”

Title	General herd mortality rate	Sire target weight at 6, 18, and 24 months of age
Formula	(Sum of dead animals / total herd) * 100	Average weight at each class
Measurement unit	Percentage	Kilograms
Goal	< 2%	200, 400, 600
Challenge target	< 1.5%	220, 450, 650
Person/people in charge	Veterinarian	Veterinarian
What does he/she do?	He/she shows herd health status and the stockmanship quality	He/she shows the growth rate and preparation of the sires for sale
Benefits	It monitors the health program	It is highly correlated with the final presentation of the product sire
Related process	Health Control and Field Operations	Production of sires, production of calves
Information generation frequency	Monthly	Three measurements per harvest (6, 18, and 24 months)
Review frequency	Annual	Annual

Table 8 - Analysis of the indicators “awards in breed contests” and “percentage of cattle marketed in niche markets”

Title	Awards in breed contests	Percentage of cattle marketed in niche markets
Formula	(number of 1 <sup>st</sup> and 2 <sup>nd</sup> places obtained / number animals participating)* 100	(number animals complying with the criteria / total number of animals sold) * 100
Measurement unit	Percentage of awarded animals	Percentage of sold animals
Goal	> 70%	> 70%
Challenge target	80%	80%
Person/people in charge	Veterinarian	Veterinarian
What does he/she do?	He/she shows the performance of genetics and management in the rings	He/she shows value added to the product
Benefits	It is correlated with brand marketing profitability	It is correlated to higher business
Related process	Production of sires	Production of finishers
Information generation frequency	Annual	Annual
Review frequency	Annual	Annual

Table 9 - Analysis of the indicators “general satisfaction of sire customers” and “percentage of retention of sire customers”

Title	General satisfaction of sire customers	Percentage of retention of sire customers
Formula	Results of a customer satisfaction survey	Number of customers making two consecutive purchases / total n. of customers
Measurement unit	Percentage of satisfactory answers	Percentage of customers
Goal	> 90%	> 50%
Challenge target	95%	60%
Person/people in charge	Veterinarian	Board
What does he/she do?	He/she shows the level of customer satisfaction with the field performance and quality of the generated products	He/she shows customer loyalty level
Benefits	It indicates the alignment of the sire selection program with the requirements of the customers. It also assesses the health program.	It is correlated with brand consolidation in the market
Related process	Production of sires, Health program	Production of sires
Information generation frequency	Annual	Annual
Review frequency	Annual	Annual

The participation of the company products in niche markets is considered effective when some value is added to the products when sold in a specific customer niche. This indicator focuses on finisher cattle (meat production) due to company potential as its herd consists of British cattle (renowned for its high meat quality) and also due to its intensive production system, which allows marketing of finishers at a young age (1 to 2 years). Together, these factors contribute for the production of distinctive meat that can potentially be sold in high value-added markets.

The indicators of the customer perspective for the macroprocess “production of sires” estimate values of 50 and 60% (goal and target) for customer retention, and 20 and 25% (goal and target) for new customers. Occasional customers account for the 15 to 30% difference. These customers purchase sires at alternate years because they buy from other suppliers (searching for different genetic lines) and also because their demand changes every year,

Table 10 - Analysis of the indicators “percentage of new sire customers” and “training hours per employee”

Title	Percentage of new sire customers	Training hours per employee
Formula	Number of first-purchase customers / total n. of customers	Total / total n. of employees
Measurement unit	Percentage of customers	Hours/employee/months
Goal	> 20%	2 h/h
Challenge target	25%	4 h/h
Person/people in charge	Board	Veterinarian
What does he/she do?	He/she shows brand expansion trend	He/she monitors the personnel training program
Benefits	It is correlated with brand consolidation in the market	It shows the effort of the company in personnel training
Related process	Production of sires	Human resources
Information generation frequency	Annual	Monthly
Review frequency	Annual	Annual

Table 11 - Analysis of the indicators “leave of absence” and “gross margin per ha”

Title	Leave of absence	Gross margin per ha
Formula	Total days of leave of absence / total n. of employe	(total revenues – expenses) / n. of esoperational ha available
Measurement unit	Days/employee	Brazilian real / hectare
Goal	None – there is not measurement record	R\$ 60
Challenge target	None – there is not measurement record	R\$ 80
Person/people in charge	Human resources manager	Board
What does he/she do?	He/she identifies the level of health problems suffered by employees	He/she monitors the financial performance of the business
Benefits	It monitors occupational health problems	It provides a broad and single view of the business
Related process	Human resources	Accounting/management
Information generation frequency	Monthly	Annual
Review frequency	Annual	Annual

1 US\$= R\$ 2.15.

Table 12 - Analysis of the indicator “gross margin per sire”

Title	Gross margin per sire
Formula	(Total revenues with sires – operational expenses of the sire account) / number of sires sold
Measurement unit	Brazilian real / sire
Goal	R\$ 600
Challenge target	R\$ 800
Person/people in charge	Board
What does he/she do?	He/she monitors process profitability
Benefits	It supports the decision of developing or not the sire production business
Related process	Accounting/management; Production of sires
Information generation frequency	Annual
Review frequency	Annual

1 US\$= R\$ 2.15

usually because of the size of the herd, which influences the number of sire replacement.

The indicator “leave of absence” was devised because of the concern of the managers with health problems of the employee caused by repetitive strain due to mounting horses for field work. This causes the loss of talents because of their physical impossibility to perform tasks that are inherent to the business. Some actions, such as improving harnesses and the selection of horse lines with a lighter trot, are being studied.

Although it is not a precise indicator of profitability, “gross margin per hectare” was adopted because it is easy to be obtained and a significant volume of information on competitors can be provided by consulting companies that provide management services to the company.

The indicator “gross margin per sire” is an example of the application of process-oriented management accounting. Despite of using the method of Cost Centers to obtain economic indicators, the company implemented specific controls to try to identify more precisely the costs related to the production of sires.

The relationship analysis aims at verifying if the indicators are aligned with the strategic goals of the company, and if it is one of the premises of the balance score card (Figure 1). It shows that all goals are being supported by at least one performance indicator of the processes that are critical for their achievement, as well as that efforts and resources are not being wasted with non-essential monitoring.

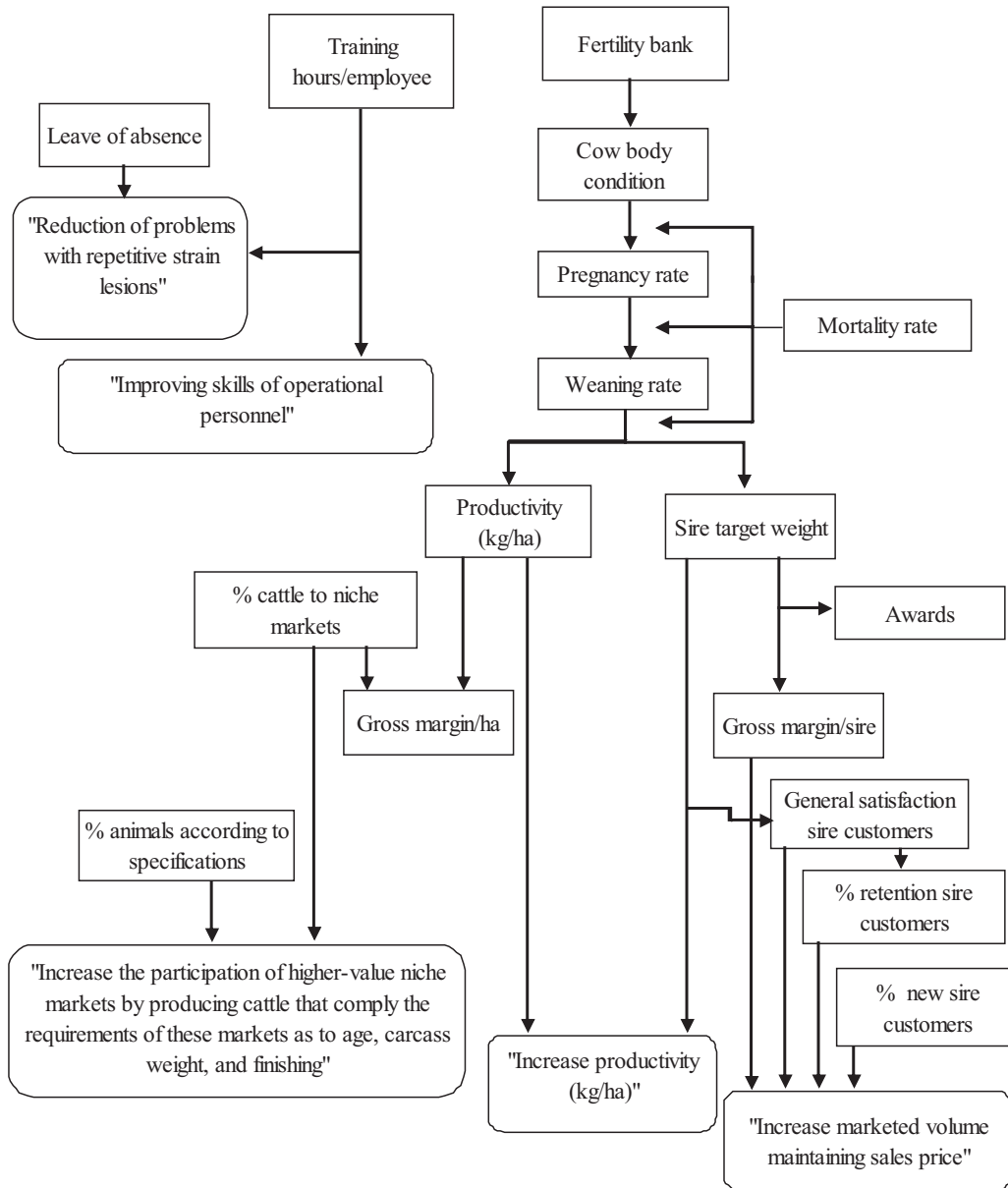


Figure 1 - Relationship between performance indicators and strategic goals.

The macroprocess “production of sires” shows high specialization since it requires a large number of indicators to monitor. The customer perspective indicators are highlighted, because this business involves a large number of purchasers, contrasting with the sales of finishers, which are usually concentrated on the hands of the oligopoly of beef packing industry.

### Conclusions

Previous determinations of strategic goals of the company are crucial to guide the establishment of an

indicator system focused on achieving these goals. The use of the balanced scored method demonstrates that the indicators are comprehensive, and they include aspects beyond the traditionally prioritized ones, and often exclusive, financial items. Moreover, the individual analysis of the indicators provides the details required to implement and to operate them, defining feasibility, responsibilities, and targets. It must be noted that indicators only diagnose the current business situation; processes evolve only by effectively implemented correctives and improved actions derived from management decisions supported by performance indicators.



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