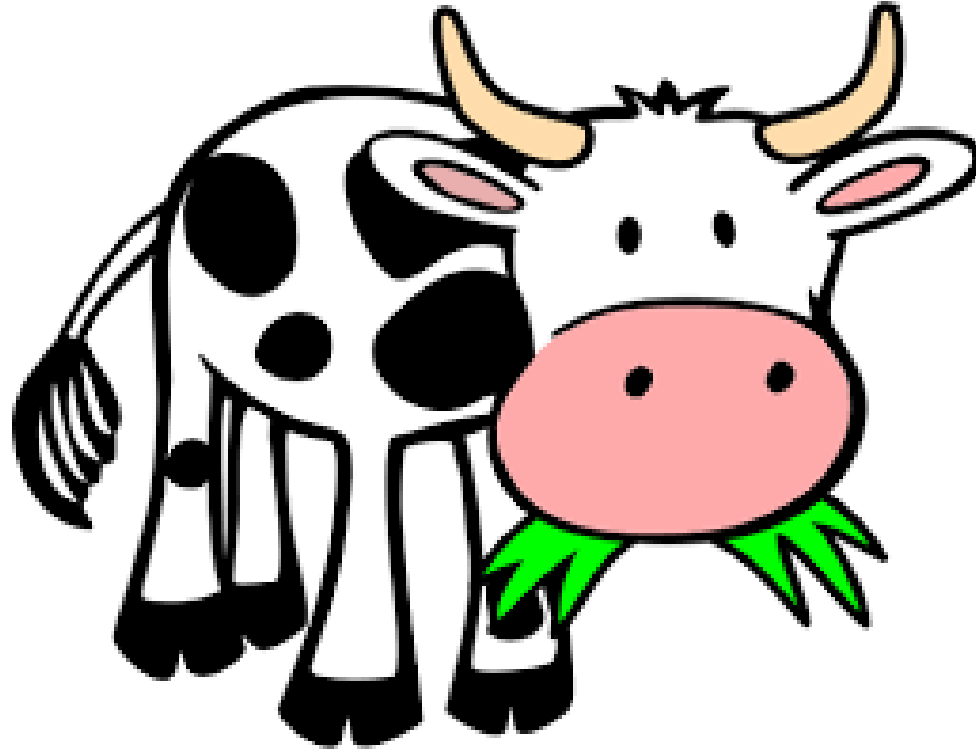# Testing the cows' ration with a new data mining software based on NOA data base

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Introduction

➢The large amounts of information currently available in the world dairy industry in general and in the Israeli dairy poses many challenges in analyzing data.

➢As smart machines and sensors crop up on farms and farm data grow in quantity and scope, farming processes will become increasingly data-driven and data-enabled.

Introduction

➢ Another key characteristic of big data is merging data from multiple sources into cloud computing.

➢ For example, in the dairy industry, big data may involve combining DHI production records, financial records, precision dairy technology data, health records, milk cooperative records, historical weather data, genomic evaluations, ration and feeding management data into one large database.

➢ Combining this information helps to improve decision-making, operational efficiency, cost and revenue optimization, and risk management.

Why in the milk industry

The Dairy industry is very suitable for this method for several reasons:

1. Is characterized by the existence of a reasonable price, there is a biological variance as well as variability in the weather as well as uncertainty.

2. There are advanced technologies that provide continuous information on the cow milk yield, fertility health problems and more .

3. Using this method of Big Data is a breakthrough in data analysis of dairy farms for better future decisions.

Ratio planning for dairy cows

Today, the nutrition requirements and the ratio planning for dairy cows is executed by the linear program.

Mathematical technique for optimal allocation of resources (for different foods) to achieve a specific goal: appropriate dietary requirements, cost reduction, and the effect of changes in nutrient content or dose requirements.

The program mainly refers to the **final price** of the ration and looks for the cheapest one.

The program does not relate to professional indices such as milk and solids.

However….

In the analysis of dairy farms data, it is possible to identify thousands of laws that describe relationships between factors (cause) and performance (result).

For each law, the significance level (error probability) can be defined, thus understanding the level of its influence on specific measures and the performance of the dairy.

In this method, nutrition planning is not only physiological. It is a method based on past experience in the same farm.
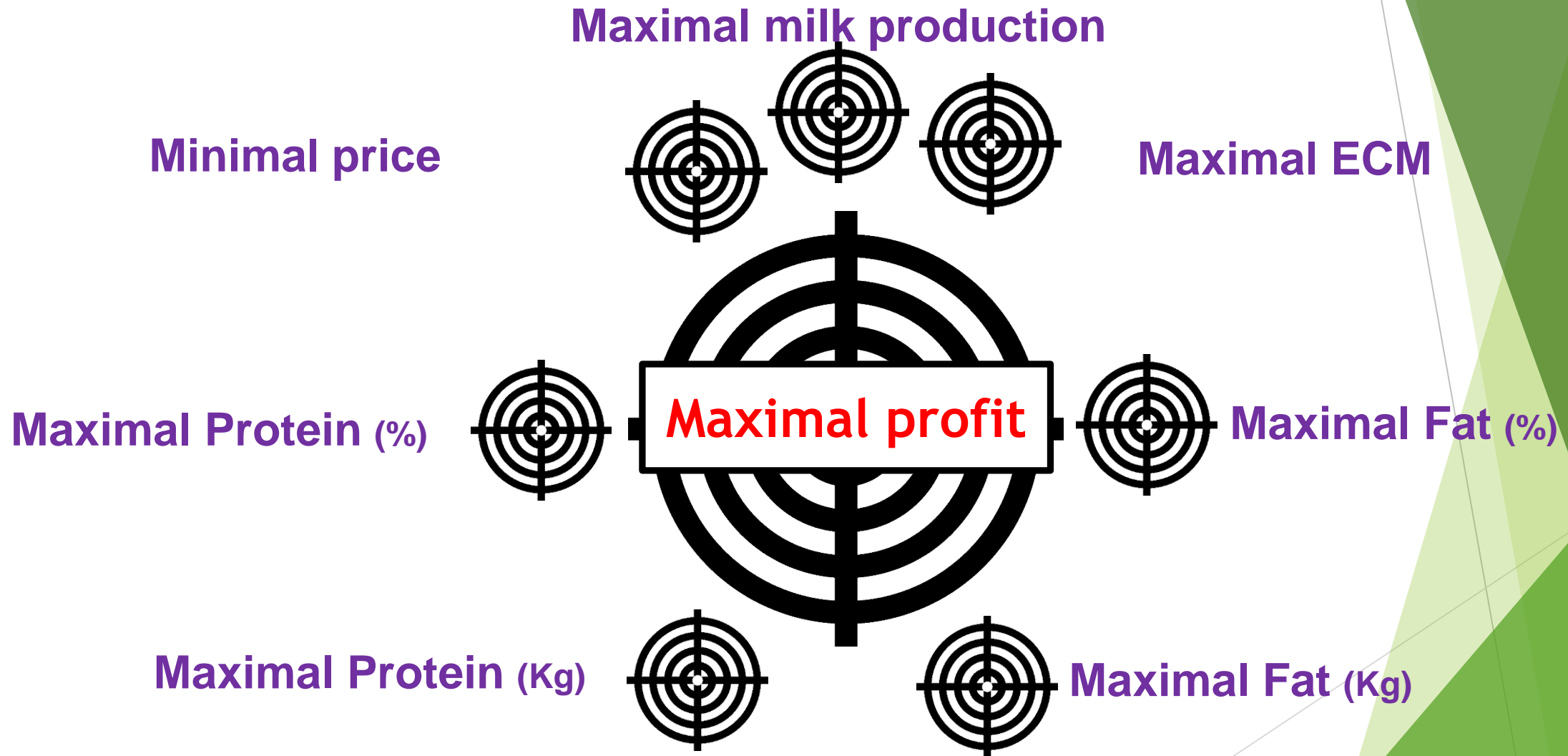
For example, the software will not offer to use foods that did not previously exist in the farm, although they can improve certain metrics.

The Goal today:
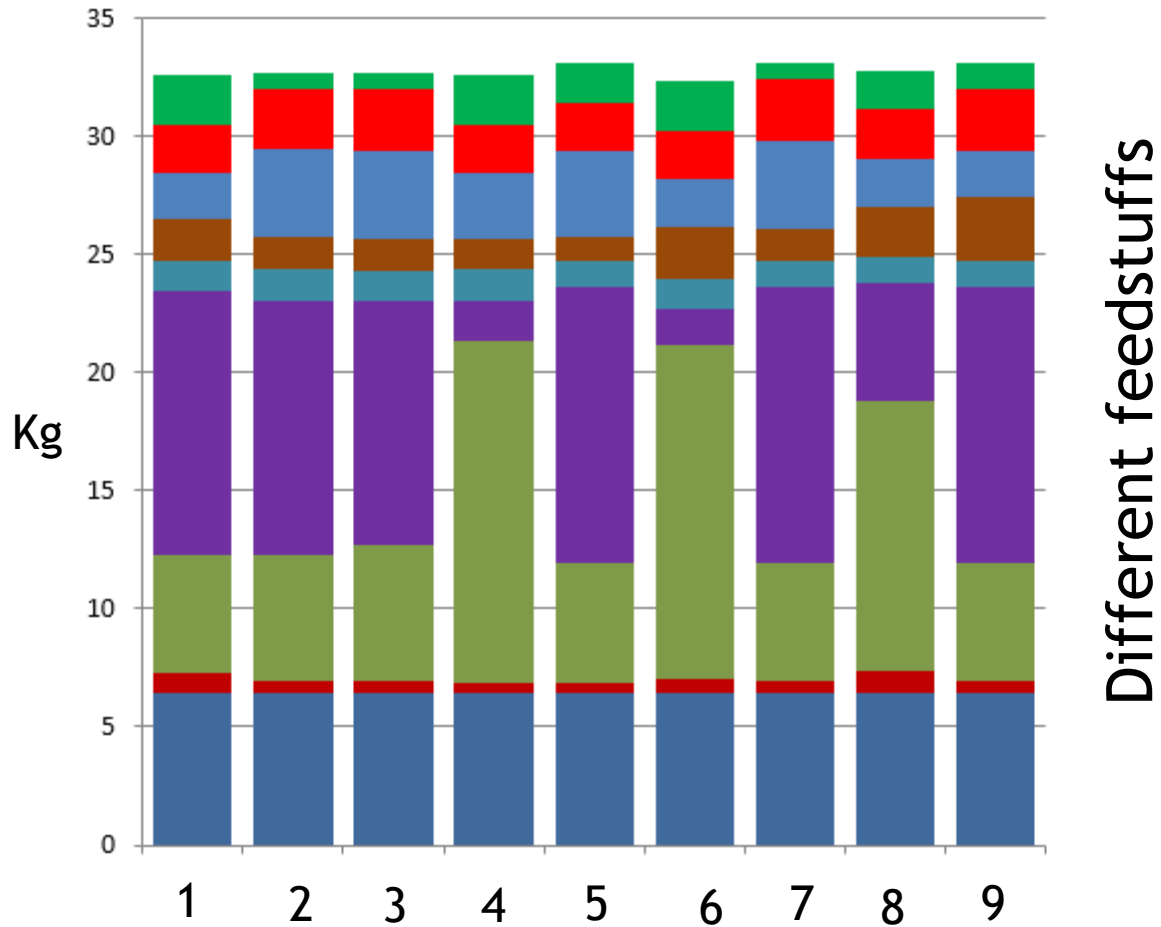## *Ration planning at the minimal cost*

Minimal price

But the price of the ration is only one component of the profit.

The new goal: Ration planning at the maximal profit

Maximal milk production

Minimal price

Maximal ECM

Maximal Protein (%)

Maximal profit

Maximal Fat (%)

Maximal Protein (Kg)
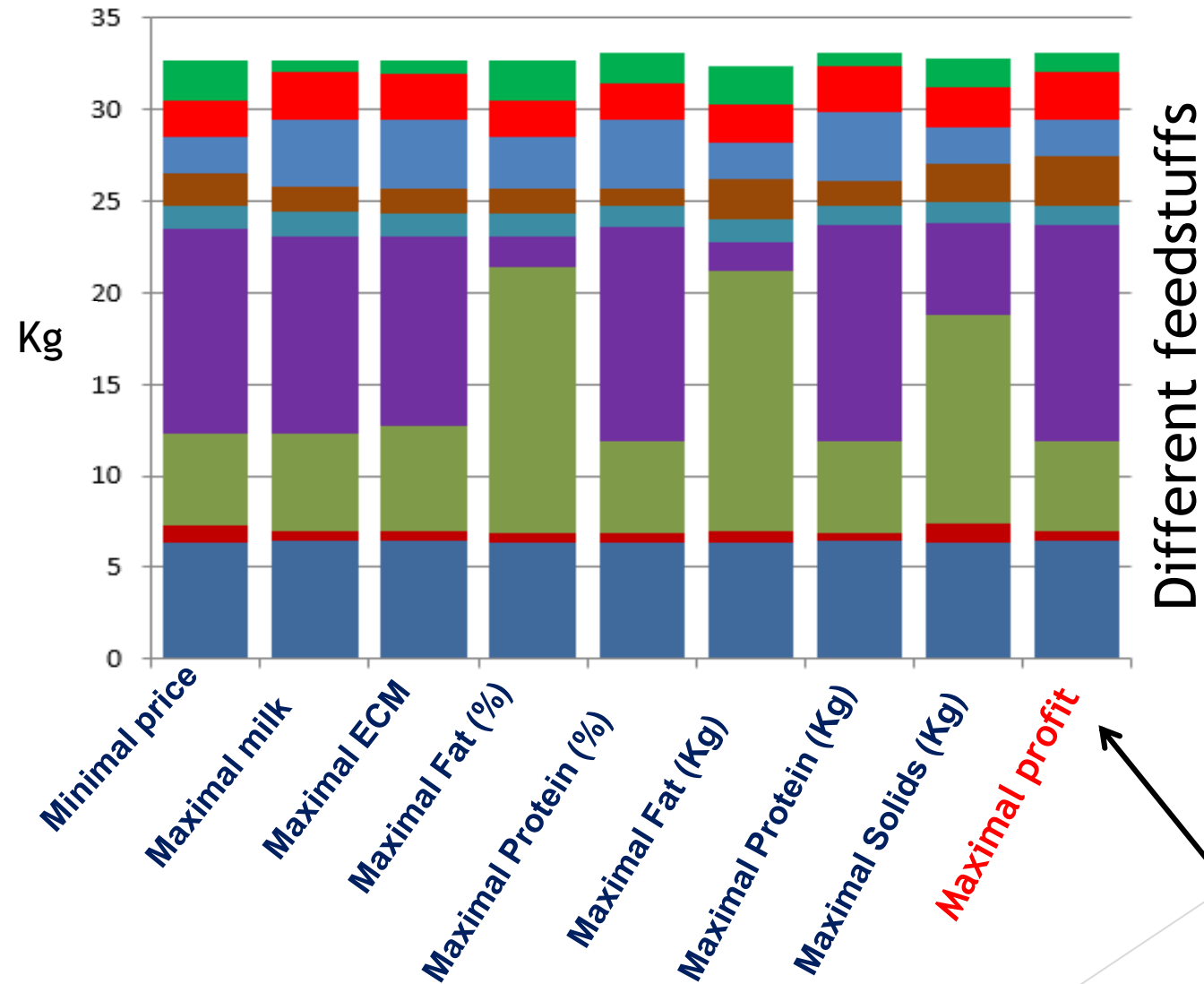
Maximal Fat (Kg)

There are different possible solutions in the physiological boundaries been set by a professional nutritionist.

Which is the best solution?

Solution 9 will give the maximal profit

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Data Base

1. Input of all your events in the herd level, group level and cow level.

2. Produce your reports according to your data : nutrition reports, DHI reports, combined reports.

3. Keep all your data safe and ready to use.

History, History, History

Herd Management program

Main features:

- Herd management

- Milk production and milk recording

- Quota planning

- Feeding management

- Genetic management and mating program

- Reports generator

- Integrated reports

- Economic management

DHI report – data on milk, fat and protein production

15/01/2019   Dairy farm: Zvolon

Comparison between groups

Until: 15/01/19   FROM: 01/08/18

Average	103	102	Subject
212	108	105	Number of cows
234	230	238	DIM
40.0	40.1	39.9	Milk Kg (DHI)
38.6	38.6	38.5	Milk Kg (Daily)
40.5	40.7	40.2	ECM Kg
3.56	3.60	3.52	Fat (%)
3.38	3.38	3.39	Protein (%)
377	296	462	SCC (*1000)

Nutrition data: data on food consumption

31/12/2018 Until   01/08/2018 From

103	102	Unit	Average
		Number of cows	
108	105		107
		DIM	
186	186		

103	102	Unit	Average	contents
26.33	26.54	Kg	26.43	Dry mater
47.15	47.26	Kg	47.20	Fresh mater
46.59	47.01	Mcal	46.80	Total energy
1.77	1.77	Mcal	1.77	Energy/dry mater
4.34	4.39	Kg	4.36	Total protein
16.49	16.54	Kg	16.51	Total (%) Protein

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Aims of Study

To examine the use of the mew method (Big Data) compared to the linear program that is used today in the Israeli dairy farms.
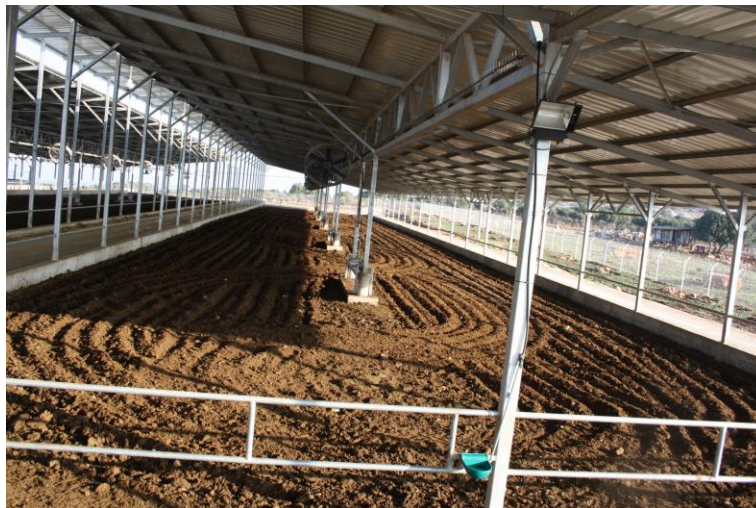
Methods

2 groups of dairy cows (n=60) were separated according to milk level, number of lactation DIM and health status.

Control group: TMR by the linear program.

Treatment group: TMR by the new method (big data) using 8 years of historical data from the dairy farm.
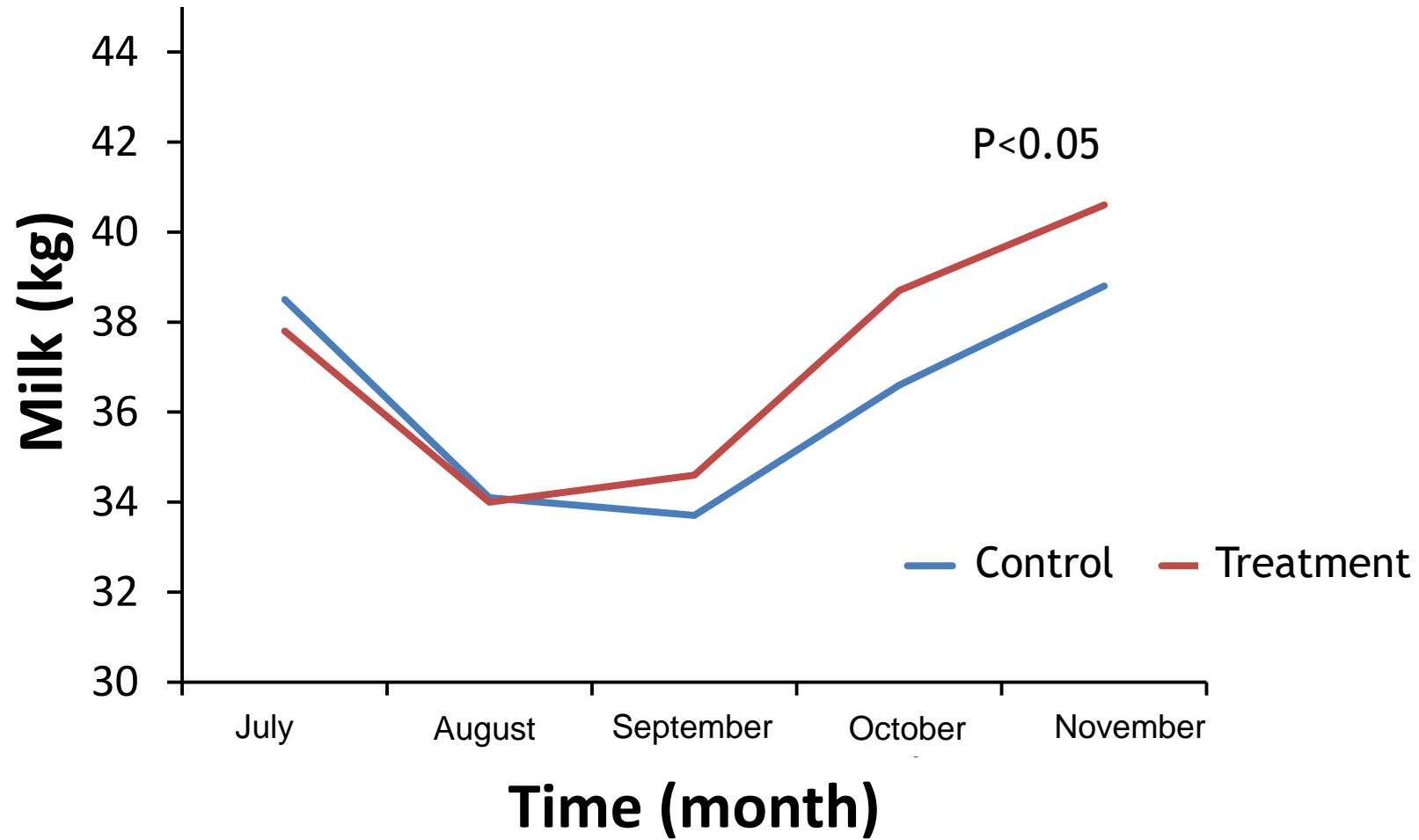
Ingredients of the diets (20 kg/dry mater)

Item	Control	Treatment
Ground corn grain	5.2	6.6
Premix*	2.4	2.1
DDGS	1.8	0.4
Dry gluten feed	3	1.6
Canola meal	2.2	3.7
Sunflower meal	0.8	1
Wheat silage	7.3	10.8
Sorghum silage	7	4
Wheat hay	1.6	1.5
Total	31.3	31.7

* Same premix for both experimental groups

Chemical composition of the diets

Item	Control	Treatment
Protein (%)	16.6	16.5
Net energy (kg of DM)	1.77	1.75
Forge NDF	18.5	18.5
Total NDF	32.6	32.5
NSC	37.9	40.5
Ether extract	4.9	4.2

ECM throughout the experiment

P<0.05

Milk (kg) — Y-axis: 30, 32, 34, 36, 38, 40, 42, 44

Time (month) — X-axis: July, August, September, October, November

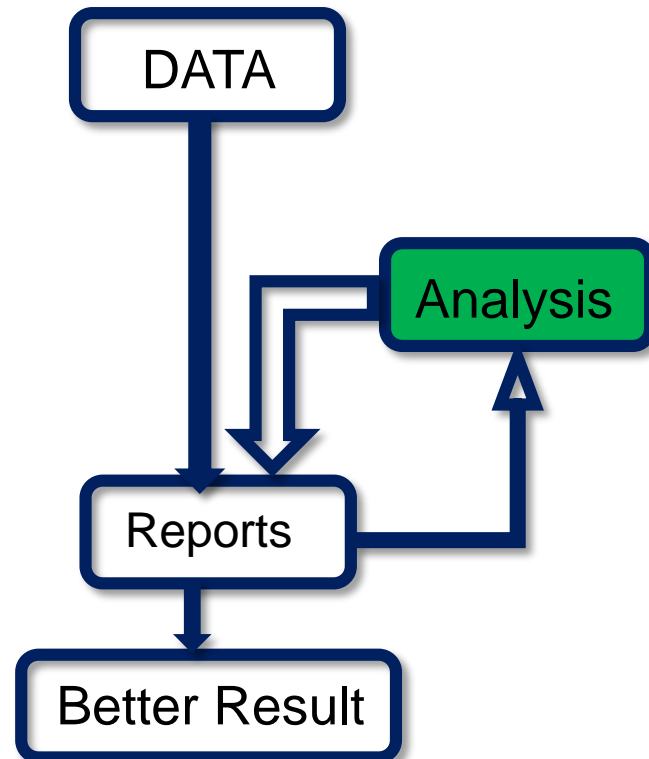Legend: Control, Treatment

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Summary

TMR planning with the new method showed higher ECM production throw all the study: 36.1 vs. 35.1kg/day.

TMR planning with the new method showed higher FAT (%) throw all the study: 3.74 vs. 3.65%. Protein level did not differ between groups.
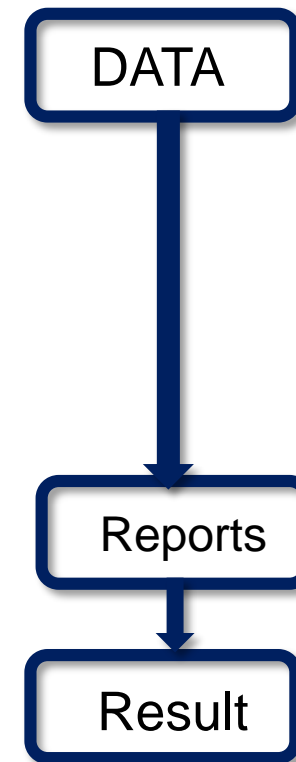
DMI did not differ between groups and was around 23.5kg dry mater/day

Conclusion

data mining

Linear program

DATA

Analysis

Reports

Better Result

DATA

Reports

Result

Conclusion

➢ Data analysis shows the different effects of different foods on production level.

➢ Effect of changes in the amount of specific food in the physiological range on milk production, fat %, protein %, food efficiency and profit.

➢ Require good quality database including historical data.

➢ Can find the most profit ratio based on the historical data from a specific dairy farm.

Learning from the past -Looking to the future

"Without data
you're just another person
with an opinion."

W. Edwards Deming

Learning from the past -Looking to the future

Data - What happen in the past? (today reports 2000-2019)

Data analysis of up to day reports - Why changes occur? Milk, fertility….

Predictions - What will happen to specific parameters?

Optimization - What is the best that can happen and how to get there?

Future Predictions: Machine Learning will be the next big thing.

- As dairy farms growing you can not look on a specific cow, all data
  analysis will be done automatically.

- More and more sensors will give a lot of data to analyze.

- What is the best time for AI according to different parameters such as
  BCS and health data?

- What is the best TMR according to specific parameters per each cow?
  individual feeding.

Thank you