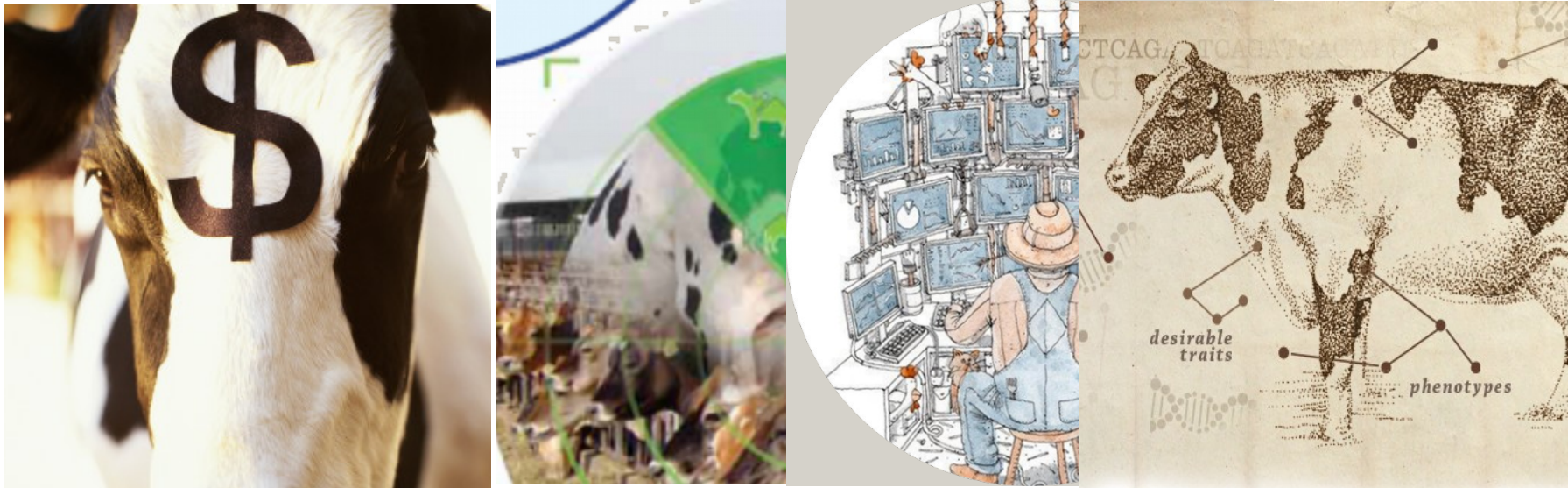


# The value of precision technologies in the genetic evaluation of dairy cows

Mariska van der Voort, Claudia Kamphuis, Henk Hogeveen

27 June 2018



# Content

- What is PDF?
- Does more precise data result in more value?
- Evolving traits with data availability

# Precision dairy farming (PDF)

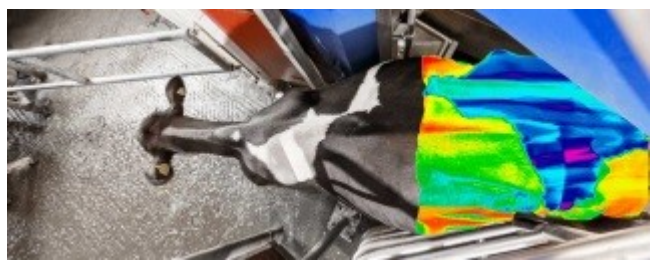
- Monitor physiological parameters related to production, health or fertility of individual cows



- Automatic milking systems and mastitis detection

ents

estrus



# Why of interest for dairy farmers

## Individual cow management still possible?



Easy



(Too) difficult



Forget it

# Why of interest for dairy management

## Family-run farm to business hiring



# Why of interest for society

Concerns on animal health, welfare and environment



# Potential benefit of PDF...

Improves animal health and welfare

Increase the production efficiency

Reduce environmental impact

Improves product quality

Improves social lifestyle

Objective monitoring



# Failure factors for adoption

Insights in the cost and benefits of the investment

Clear management decision remain limited

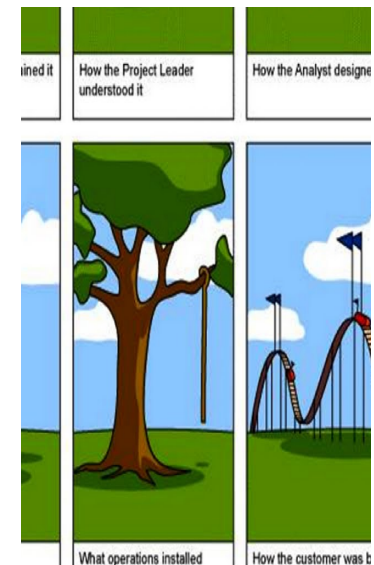
Different expectations



What he had in mind



What he thought he bought



What he actually got



# Content

- What is PDF?
- Does more precise data result in more value?
- Evolving traits with data availability

# Value of information

Expected utility **with** information

- Expected utility **without** information



= Value of information

Information enables us to make better decision

□ It may change our decision!

# Improved value with data - estrus

## *Annual net cash flow Dutch dairy farm with 130 cows*

			\$/year
	NEW situation <b>with</b> sensor info	SN 80% SP 95%	\$ 210,458
	OLD situation <b>without</b> sensor info	SN 50% SP 100%	\$ 207,090
=			\$ 3,368

(Rutten et al., 2013)

# Improved value with better accuracy

*Profit typical US dairy farm with 1,000 cows*



		\$/cow/year
Poor (30% SN)	Improve with 30%	13
OK (60% SN)	No improvement	-1
OK (60% SN)	Improve with 20%	16

(Giordano, 2014)

# How improve accuracy of information?

I. Development of sensor technologies

II. Improved algorithms

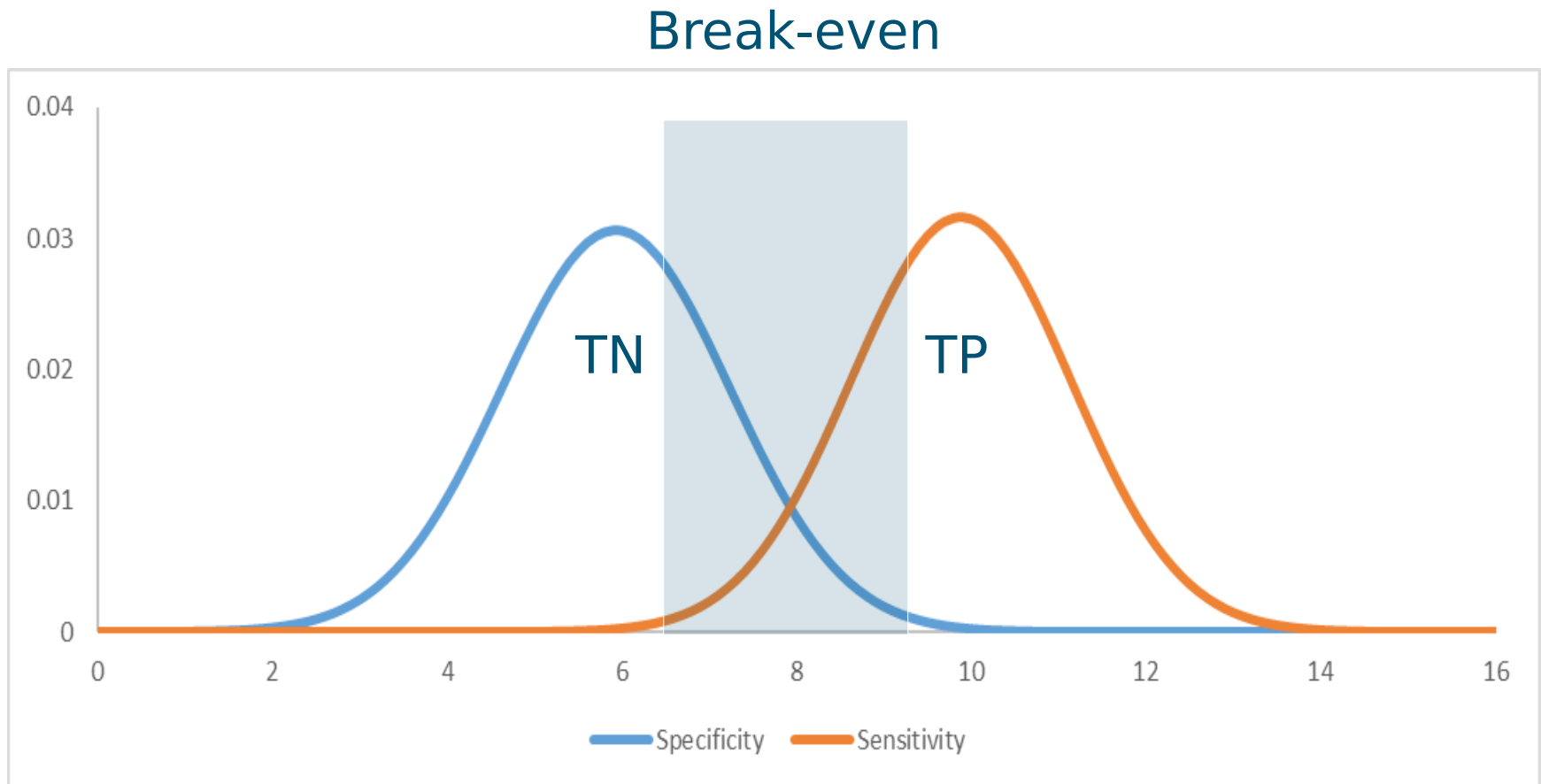
III. Adding relevant data sources to sensor data

- SCC data decrease false alerts (Kamphuis et al., 2008)
- Non-AMS data reduce false-positives (Steeneveld et al. 2010)
- Non sensor data improve performances (Jensen et al., 2016)

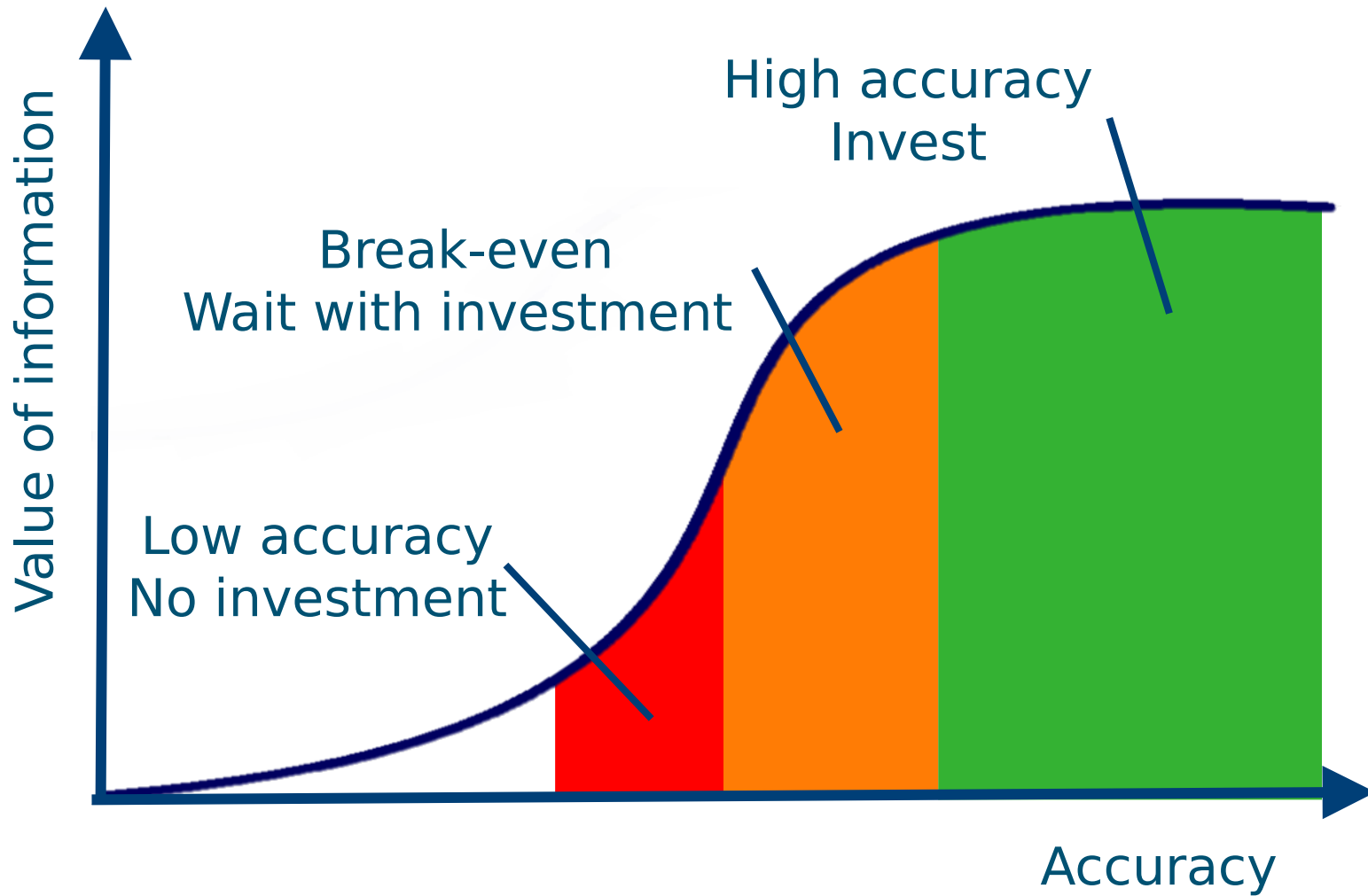


# Trade-off sensitivity and specificity

Improving one is often at the expenses of the other



# Accuracy versus investment



# Content

- What is PDF?
- Does more precise data result in more value?
- Potential value of PDF to genetic selection



# Breeding goal for decades

## Holstein sets new milk record: 74,650 pounds

*In comparison, the national average of Holsteins on test is 24,953 pounds*

By **Other News** - January 20, 2016

3756 0



*Bur-Wall Buckeye Gigi, a Wisconsin Holstein, set a national milk production record of 74,650 pounds of milk, with 2,126 pounds of fat and 2,142 pounds of protein. Nick Sarbacker photo*

BRATTLEBORO, Vt. — A 9-year-old Holstein cow in Wisconsin has broken the national milk production record.

Bur-Wall Buckeye Gigi, bred and owned by the Behnke family of [Bur-Wall Holsteins](#) in Brooklyn, Wisconsin, calved at nine years and three months, and set a 365-day record of 74,650 pounds of milk, with 2,126 pounds of fat and 2,142 pounds of protein. In consumer terms, that production equals 8,680 gallons.

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## Dairy Herd Management

NEWS - MANAGEMENT RESOURCES - FARM JOURNAL'S MILK - EVENTS - MAGAZINE

## New National Milk Production Record Set by Wisconsin Cow

Jim Dickrell

October 19, 2017 02:11 PM



Print



One Wisconsin cow has beat out another Wisconsin cow for the most milk produced in a single, 365-day lactation, reports Holstein Association USA.

Selz-Pralle Aftershock 3918 produced 78,170 lb of milk, 3,094 pounds of butterfat and 2,393 lb of protein in her last lactation. She is owned by Pam Selz-Pralle and Scott Pralle, Humbird, Wis. Aftershock 3918 produced an average of 15 lb of combined fat and protein each day of her most recent lactation, and had produced 44,000 lb. of milk as a three-year-old and nearly 59,000 lb of milk as four-year-old.

# Today many more traits

## CRV Bulls Excel in Health Traits

April 6, 2018 DairyBusiness News Yoda News 0

FOCUS ON GENETICS

## New Trait – Cow Livability Now Available

More tools continue to be developed for improvement of breed's health and longevity

CRV continues to lead the way in health traits and provides a

## New Evaluation Traits for Dairy Cattle

By [Sharon Durham](#)

September 25, 2003

Evaluating dairy cows by how easily they give birth—pregnant again—is the newest information resource that [Service](#) scientists are providing to livestock breeders' operations.

The first national genetic evaluation for methane emissions rate "pre-

## Zoetis Adds Calf-Health Traits to Genomics Service

John Maday

March 1, 2018 10:01 AM



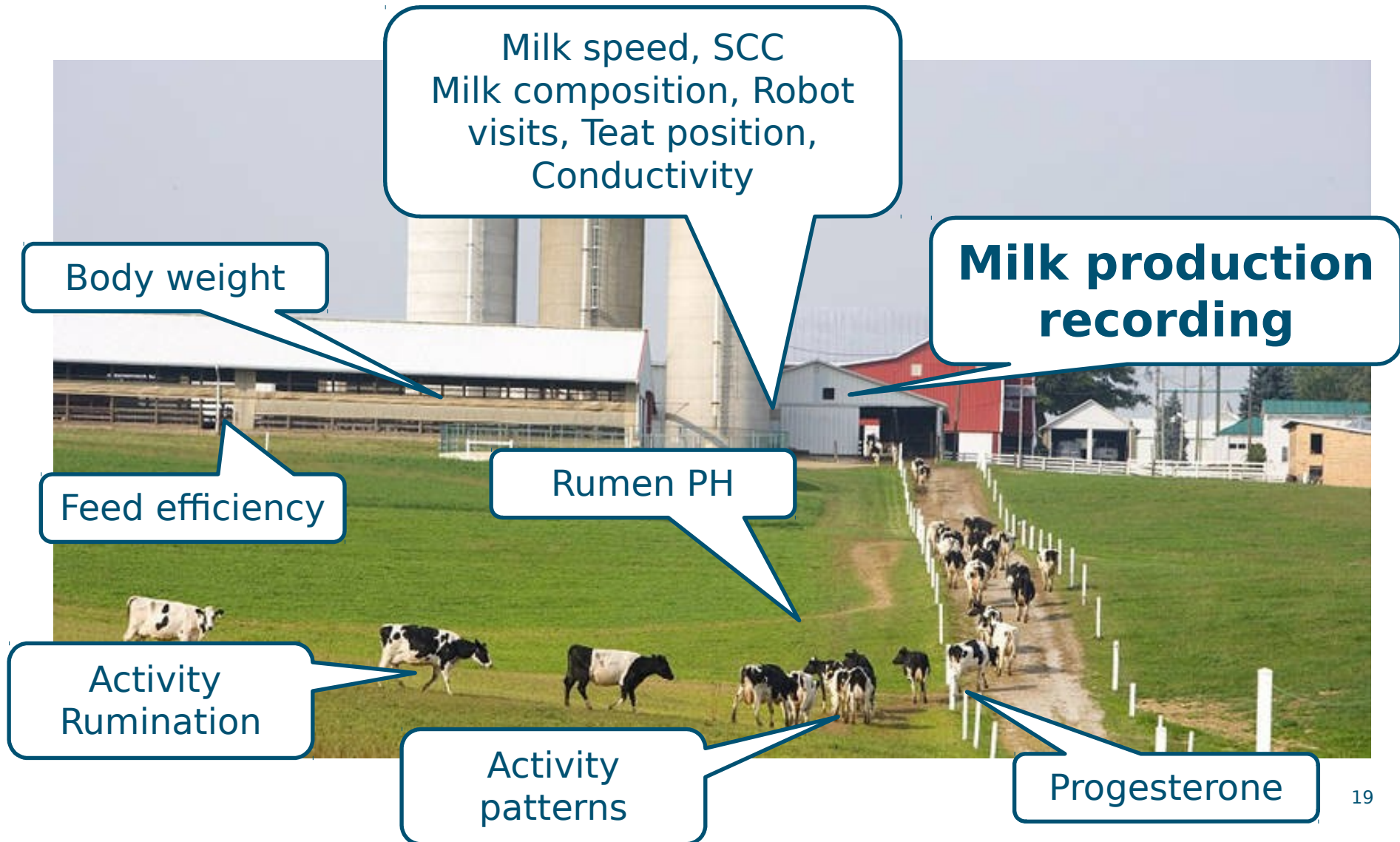
**STSM: Inclusion of methane emissions as a breeding goal in dairy cattle**

traits, in 1994, fo

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## BREEDING FOR RECOVERABILITY – A NOVEL APPROACH TO IMPROVE GENETICS OF UDDER HEALTH IN DAIRY COWS

# Data sources for genetic evaluation



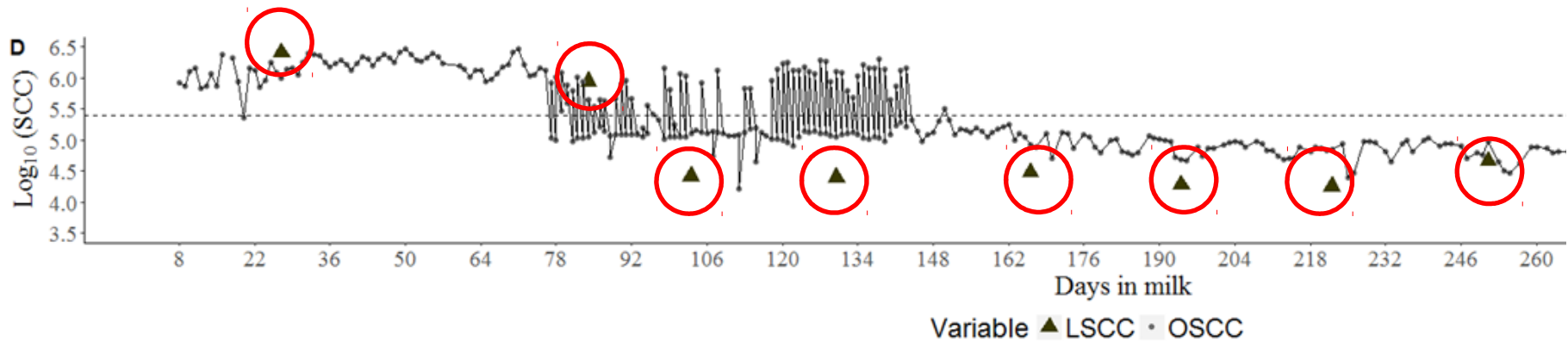
# Potential value to genetic evaluation

- Reduction in data collection costs
- Improved precision of traits
- Development of new phenotypes



# Improved mastitis trait

- Daily somatic cell count data (Deng et al., unpublished data)



- Patterns of peaks in SCC (de Haas et al., 2003)
- Combine SCC with udder conformation traits

# New trait feed-efficiency

- Individual roughage intake data not available

## Alternatives

- Milk composition
- Rumination and cow activity
- Laser methane detector



# Operationalizing precision phenotypes

Innovative tools to optimise  
Resilience  
Efficiency



## On-farm phenotyping



At-market  
technologies



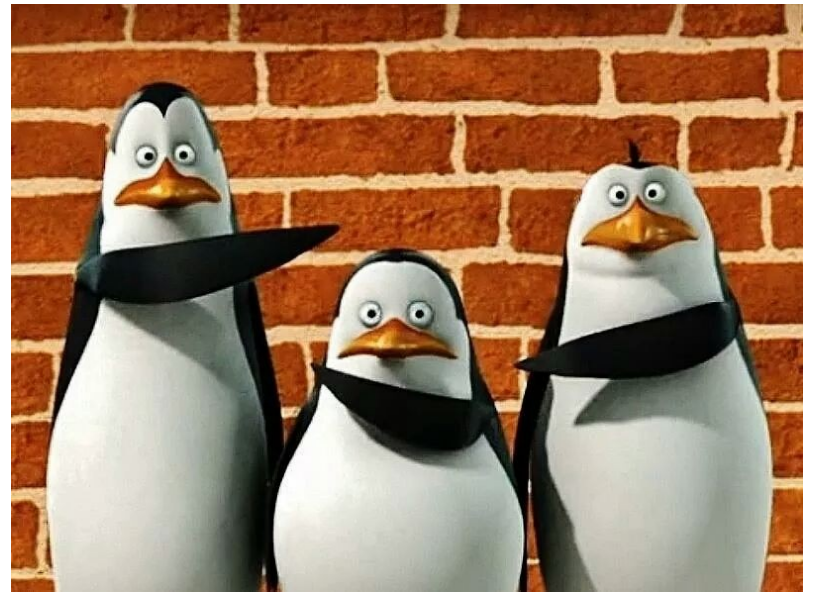
Big Data across  
farms



Near or far-off market  
technologies

# PDF for genetics - who invests?

- The farmer invests
- Cooperative principles
- New business models



*Avoid pointing fingers at each other*



# So, what I would like you to remember

- More precise data potentially improves the value of information
- PDF provides opportunities for genetic evaluation
  - Improving traits
  - Developing new traits
- New business models needed to make the value of data visible and stimulate data integration

Thank you for  
your attention

# WORLD of COW

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