

# **New concepts and traits for organic dairy cow breeding**

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# 1. Problems of Organic Dairy Cow Breeding (results of several surveys and workshops with Swiss organic breeders)

Most organic breeders are geared to conventional breeding. Most conventional lines and races are highly productive.

Forage on organic farms is often not consistent with cows' milk production. Risks of animal diseases are increasing.

Motivation for dairy cow breeding is decreasing on organic farms.

Cows are often too big: not suitable for summer alpine pasturing.

Longevity and health traits don't get enough weight in selection.

There are not many AI-sires suitable for organic farms (especially for mountain regions). More information on AI-sires is needed.

Natural mating is only used on 10% of organic farms.

Knowhow of experienced organic breeders is not used by others.

## 2. FiBL-Projects (Advisory Projects)

Introduction of a new tool to estimate site-relatedness of dairy cattle breeding on organic farms:

Comparing farm factors and animal factors.



# Comparison of herd- and farm- factors

- > Raising farmers awareness of the relations between farm environment, feeding possibilities, milk yield and animal health:
- > A flexible farm with best conditions for animal husbandry and forage production can breed exigent cows with a high milk production.
- > A farm with limited conditions must have undemanding, robust cows with a limited milk production.
- > Hypothesis: if breeding strategies are well site-related, herd health is better.

# A Breeding-Advisory Project

**100 organic farms in Swiss mountain regions get estimated and supported for site related breeding**

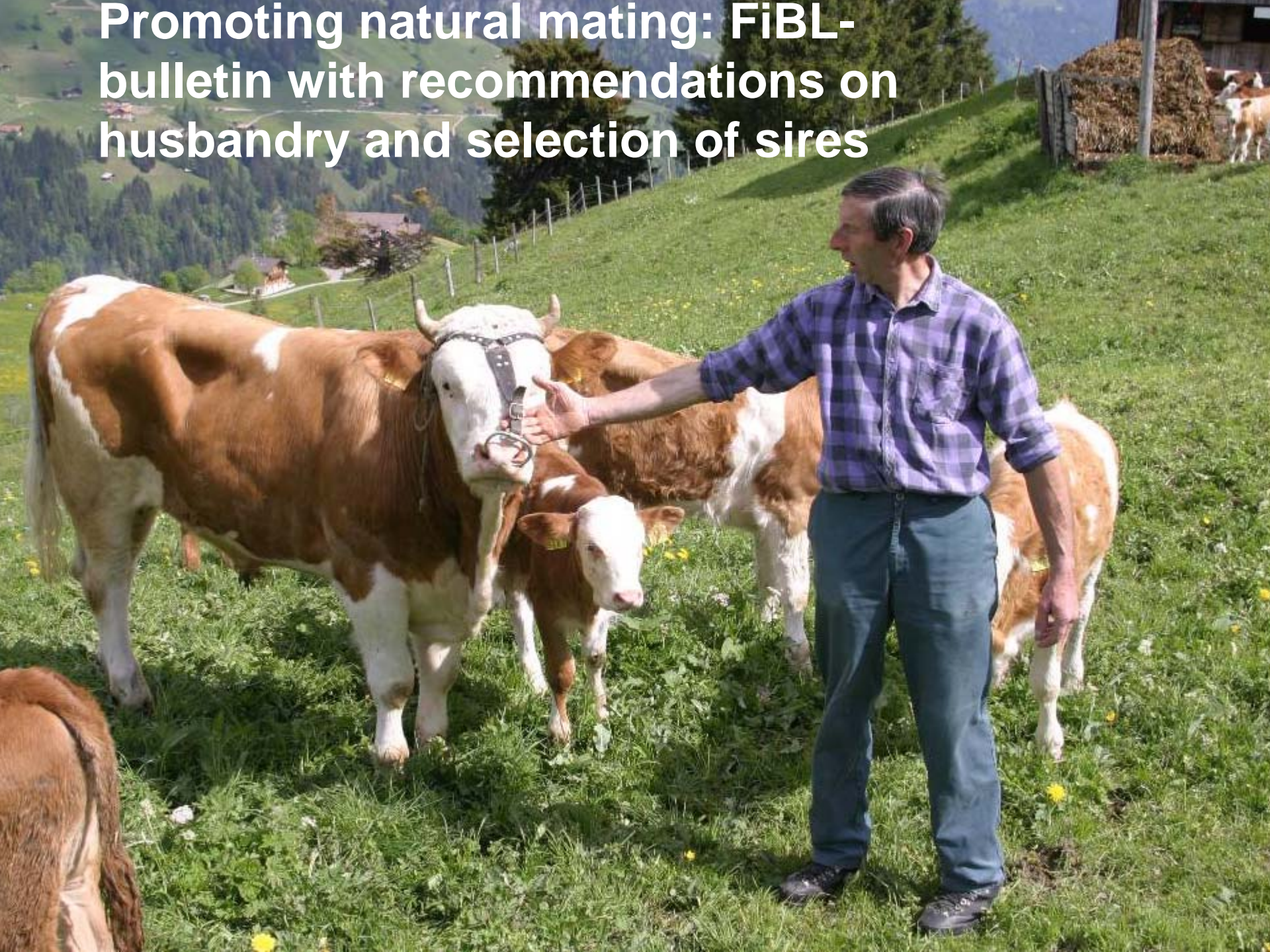
**First results are expected in autumn 2009**

# A website to promote site related breeding on farm: [www.biorindviehzucht.ch](http://www.biorindviehzucht.ch) / [www.elevagebovinbio.ch](http://www.elevagebovinbio.ch)



The screenshot shows a Mozilla Firefox browser window displaying the website <http://www.biorindviehzucht.ch>. The browser's address bar shows the URL, and the page title is "Biorindviehzucht für die biologische Landwirtschaft in der Schweiz". The website features a navigation menu with "Kontakt" and "Impressum" buttons, and a search bar labeled "Suche". A sidebar on the left contains a menu with items: "Startseite", "Aktuelles", "Stiere 'künstliche Besamung'", "Stiere 'Naturesprung'", "Grundlagen Biozucht", "Marktplatz", and "Links". The main content area has a heading "Biorindviehzucht - für die biologische Landwirtschaft in der Schweiz" followed by a quote: „Die Gesundheit und die Leistungsfähigkeit (Lebensleistung) der Nutztiere sowie die Qualität der tierischen Erzeugnisse sind durch die Wahl geeigneter Rassen und Zuchtmethoden zu fördern.“ (Art. 16c58 der Schweizerischen Bioverordnung). Below this is a section titled "Gesunde langlebige Tiere" with a photograph of cows in a field and text explaining the importance of healthy, long-lived animals in biological agriculture. A "top" link is visible at the bottom of the text. The browser's status bar at the bottom shows "Fertig".

# Promoting natural mating: FiBL- bulletin with recommendations on husbandry and selection of sires



# Phd-project: New Concepts and Traits for Organic Dairy Cow Breeding



# The study aimed to find basically new approaches for organic dairy cow breeding

## 1. Philosophical / historical backgrounds:

- > Holistic Biology
- > Epistemology / Anthroposophy
- > Complementary aspects to genetics
- > History of animal understanding and of animal breeding in Europe

## 2. Explorative study in a dairy herd on a biodynamic farm

Investigations on individual phenotypic behaviour traits and metabolic traits of dairy cows and their relations to individual animal health.

# Philosophical / historical backgrounds:

## Methods:

### Literature survey on:

- > Nature- and animal understanding, focussing on idealistic and holistic views (e.g. Goethe, Steiner, Uexküll, Driesch, Meyer-Abich, Portmann, Jonas, Sheldrake, Hoffmeyer, Wemelsfelder)
- > Animal breeding books and –papers from different ages (between 1880 and today)
- > Complementary views on genetics and evolution theories (e.g. Snell, Nathusius, Steiner, Kammerer, Illies, Mc Clintock, Jablonka, Fox-Keller).

# Philosophical / historical backgrounds:

## Results: Biology

- > The development of biology as a part of science became more and more materialistic and reductionist during the last 200 years. But there have always existed (smaller) holistic and idealistic movements. Organic Agriculture is one of those movements.
- > All complementary, more holistic researchers and thinkers (over the last 200 years) show a common view of the organisms: they stress their proper individual activity and their own potential for innovation and adaptation as well as their wholeness and integrity (see: Baars, 2002).

# Philosophical / historical backgrounds:

## Results: Breeding History

- > Considering breeding books over the last 130 years a similar reductionist development can be observed.

<b>Themes of Breeding Books (in % of contents)</b>	<b>Wilckens 1888 / 1903</b>	<b>Kraemer 1894 / 1911</b>	<b>Werner 1903</b>	<b>Hansen 1927</b>	<b>Hage- doorn 1939</b>	<b>Haring Johansson 1959</b>	<b>Kräuss- lich 1994</b>
Beauty	<b>0</b>	<b>2.8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Animal Health	<b>2.5</b>	<b>2.8</b>	<b>0</b>	<b>0.4</b>	<b>3</b>	<b>0.3</b>	<b>1</b>
Relation to Environment	<b>11.7</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>0.3</b>	<b>1</b>
Races	<b>1.3</b>	<b>0</b>	<b>40</b>	<b>47</b>	<b>2</b>	<b>0</b>	<b>2</b>
Genetics / Heredity	<b>7.4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15.1</b>	<b>44.3</b>	<b>40</b>
Breeding History	<b>0</b>	<b>0</b>	<b>8</b>	<b>3.7</b>	<b>4.7</b>	<b>4.1</b>	<b>5.4</b>
Breeding /Se- lection Techni- ques /Methods	<b>27.6</b>	<b>63.2</b>	<b>13.8</b>	<b>9.6</b>	<b>48.3</b>	<b>18.4</b>	<b>42</b>
Body /Build	<b>0</b>	<b>13.5</b>	<b>5</b>	<b>10.6</b>	<b>0</b>	<b>0.3</b>	<b>0</b>
Other	<b>46.6</b>	<b>9.7</b>	<b>28.4</b>	<b>20.2</b>	<b>13.9</b>	<b>32.3</b>	<b>8.6</b>

# Philosophical / historical backgrounds:

## Results: Breeding Theories and Genetics

- > Today animal breeding science is aiming to select animals more and more based on genome analysis in place of phenotypic performance tests. This is a most reductionist view on breeding.
- > New publications show that the genetic way is only one possibility of passing features on from one generation to the next one and that genes are not always stable during an organism's life (see Jablonka et. al., 2005). The only focus on genetics in modern animal breeding is criticised in this study.

# Philosophical / historical backgrounds:

## Conclusions

- > Organic animal breeding has to be related to the environment of the organic farm.
- > Organic breeding should not be gene-centered
- > Organic breeding has to respect the animals' own integrity and species-specific features.
- > Animal breeding should account for the organisms' and the individuals' own activity and potential for innovation and adaptation

# Explorative study in a dairy herd on a biodynamic farm:

## Hypothesis

- > Behavioural and physiological characteristics of dairy cows (related to digestion and metabolism) are individually different.
- > Those characteristics are related to animal health.
- > They show individual ways of the animals to cope with their environment (fodder).

## Goal

- > To find new help traits for breeding for good health

# Explorative study in a dairy herd

## Methods

- > Ruminating parameters, lying parameters, body condition score (BCS), manure consistency and temperament were observed and measured repeatedly.
- > Two projects with 34 and 27 cows respectively were carried out.
- > All illnesses of each cow were counted and weighted during the same year as the observations took place.

# Explorative study in a dairy herd

## Statistical methods

- > Individual consistency of behaviour was analysed by calculating reproducibility of repeated measurements: „r“ =  $\sigma_i / \sigma_g$  (variance of individual over variance of the herd)
- > Correlations between animal health and observed parameters and linear regressions with animal health as the dependent variable were calculated.

# Explorative study in a dairy herd

## Results

- > Individual differences were found for all observed behaviour parameters, manure consistency, and temperament.
- > Cows with a higher medium BCS (during one year) were healthier (n= 34; r= 0.43; p< 0.05)
- > Cows with lower BCS-ranges were healthier (n= 34; r= -0.32; p= 0.06)
- > Cows which showed great variation in ruminating speed were healthier (n= 27; r= 0.39; p< 0.05)
- > Cows with a calm temperament had a better udder health (n= 34; r= 0.51; p< 0.01)

# Explorative study in a dairy herd

## Discussion / Conclusions

- > Further studies are needed to assure those results.
- > Other studies also show (even genetic) correlations between BCS-traits and animal health (Gredler *et al.*, 2006a, b).
- > It makes sense to use BCS-traits in breeding- and selection strategies on farm and to integrate them into population-wide breeding programs.
- > Both explaining factors for good health: BCS and variability of chewing speed are emerging from the animal's individual and active relations and reactions to the environment (feeding).

# Synthesis

- > The results of this explorative part of the study can be connected to the conclusions of the first part: that it makes sense to account for the organisms' activity and potential for individual adaptation and coping with the environment in organic animal breeding.

Thank you for your attention

