Claw health diagnoses in the routine health monitoring system of Austrian Fleckvieh cattle

Birgit Fuerst-Waltl (Univ. Nat. Res. and Life Sci. Vienna),
Christian Fuerst and Christa Egger-Danner
(ZuchtData, Vienna)

Session 7, birgit.fuerst-waltl@boku.ac.at

63rd Annual Meeting EAAP, Bratislava, Slovakia, August 27, 2012

Overview

- Background
- Health monitoring in Austria
- Claw health data
- Genetic analysis
- Breeding value estimation
- Conclusions and outlook

Background

- Growing **awareness** of health traits in dairy cattle
  - farm economy
  - animal welfare
  - food safety
- Continued non-consideration of health eventually leads to increased incidences (**antagonistic relationships** to production)
- Information on direct health traits still **scarce**

3

Background

- Following the Scandinavian countries, Austria started to **routinely** record **direct health** data for cattle in 2006
- **Genetic analyses** for mastitis, fertility traits and milk fever
- Implementation of **routine** genetic evaluation for these traits in Fleckvieh

4

Background

- Aside from mastitis and fertility, problems with **feet and legs** among most important **reasons** for **disposal** of dairy cows
- For breeding purposes, trait complex is mostly considered **indirectly** only (conformation scores)

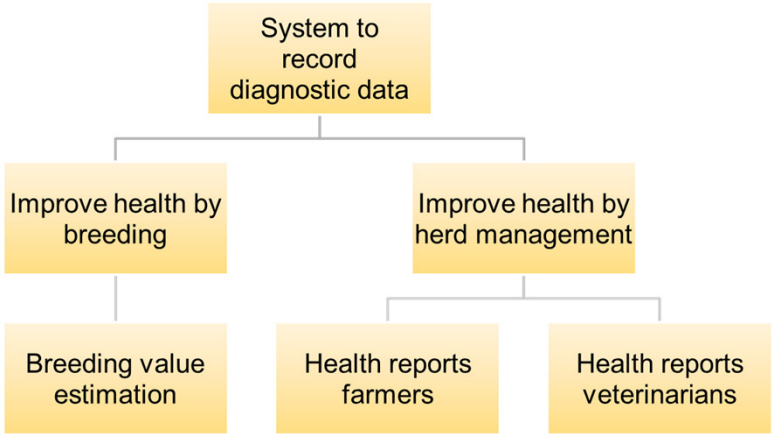
5

Background Fleckvieh

- ~ 7% of **disposals** due to feet and legs
- **Genetic evaluation** (AUT/GER) for feet and legs score and 4 linear scoring traits
- **Questionnaire** (Steininger et al., 2012) among breeders revealed high interest in claw health as **novel trait**
- Inclusion of claw health data in **genetic evaluation** and **total merit index**?

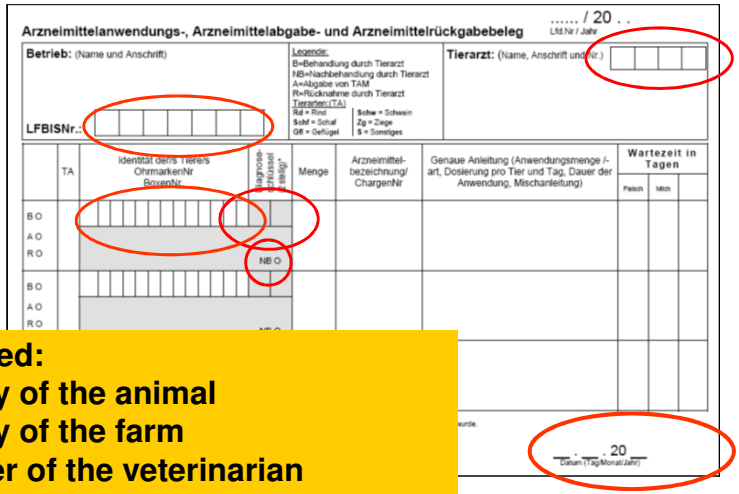
6

Health monitoring in Austria



7

Health monitoring in Austria:
receipt for application of drugs


Arzneimittelanwendungs-, Arzneimittelabgabe- und Arzneimittelrückgabebeleg

Betrieb: (Name und Anschrift)

LFBISNr.:

Tierarzt: (Name, Anschrift und Nr.)

TA | Identität des/r Tiere/s OhrmarkenNr BoxenNr | Diagnose (Schlüssel siehe Beilage) | Menge | Arzneimittel-bezeichnung/ ChargenNr | Genaue Anleitung (Anwendungsmenge /-art, Dosierung pro Tier und Tag, Dauer der Anwendung, Mischanleitung) | Wartezeit in Tagen: Fleisch, Milch

Recorded:
- **Identity of the animal**
- **Identity of the farm**
- **Number of the veterinarian**
- **Diagnoses and date of diagnoses from first treatments only**

8

Health monitoring in Austria:
Standardisation of diagnoses

Diagnoseschlüssel

Spezifische Kälberkrankheiten
11 Nabelentzündung
12 Nabelbruch
13 Sehnenkontraktur
14 Missbildungen
15 Ikterus haemolyticus neonatorum
16 Kälberdurchfall
17 andere Krankheiten des Kalbes

Erkrankungen des Verdauungstraktes
21 Durchfall
22 Tympanie
23 Pansenübersäuerung
24 Fremdkörpererkrankung
25 Labmagenverlagerung
26 Darmverschluss

Fruchtbarkeits-u. Abkalbest.
41 Gebärmutterentzündung
42 Stillbrunst, Azyklie
43 Ovarialzysten
44 Scheidenvorfall
45 Abortus und andere Störungen der Gravidität
46 Schwergeburt
47 Geburtsverletzungen
48 Nachgeburtsverhaltung
49 puerperale Erkrankungen

Eutererkrankungen
51 akute Euterentzündung
52 chronische Euterentzündung
53 Erkrankungen der Euter- und Zitzenhaut
54 Euterödem
55 Andere Eutererkrankungen
56 Prophylaktisches Trockenstellen

Klauen- und Gliedmaßenerkrank.
61 Panaritium, Mortellaro
62 Klauengeschwür, Krankheiten der Gelenke an den Klauen
63 Klauenrehe
64 Frakturen, Luxationen, andere Gliedmaßenverletzungen
65 Krankheiten von Muskeln und Sehnen
66 spastische Parese, Paralyse
67 Peritarsitis

68 Festliegen infolge Erkrankung des Bewegungsapparates
69 Krankheiten des Schwanzes

Erkrankungen der Atemwege
71 Erkrankungen der oberen Luftwege
72 Lungenentzündung
73 andere Lungenerkrankungen

Herz-, Kreislauf- und Bluterkrank., Erkrankungen des Harntraktes
81 Herzerkrankungen
82 Septikämie, Anämie
83 Piroplasmose und andere Parasitosen des Blutes
84 Leukose
85 Erkrankungen der Gefäße und der Milz
86 Pyelonephritis
87 Erkrankungen der Harnblase

ZNS-Erkrankungen, Hauterkrankungen, Infektionen
91 ZNS-Erkrankungen
92 Erkrankungen der Sinnesorgane
93 Parasitosen und Infektionen der Haut
94 Erkrankung der Hörner
95 andere Hauterkrankungen
96 Allgemeininfektionen

Sonstige Erkrankungen
01 Abmagerung, Kachexie
02 verminderte Fresslust, Inappetenz
03 Fieber, fieberhafte Allgemeinerkrank.
00 ohne Diagnose

panaritium,
dermatitis digitalis,
sole ulcer,
white line disease

Health monitoring in Austria:
Recording of data (Egger-Danner et al., 2012)

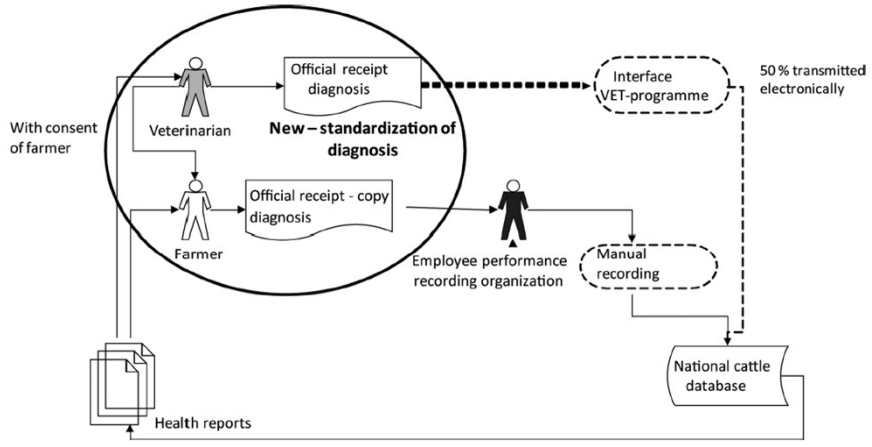
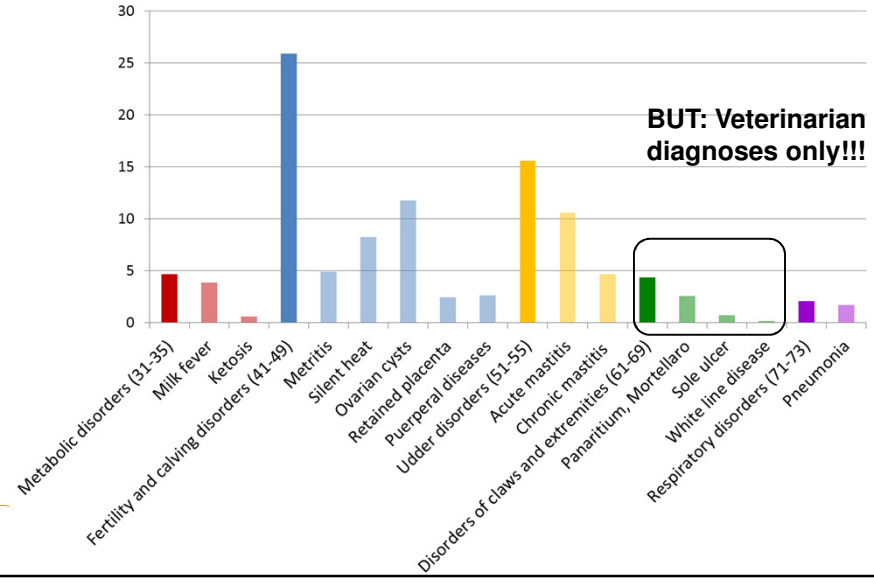


Figure 1. Recording of diagnostic data. VET = vocational education and training.

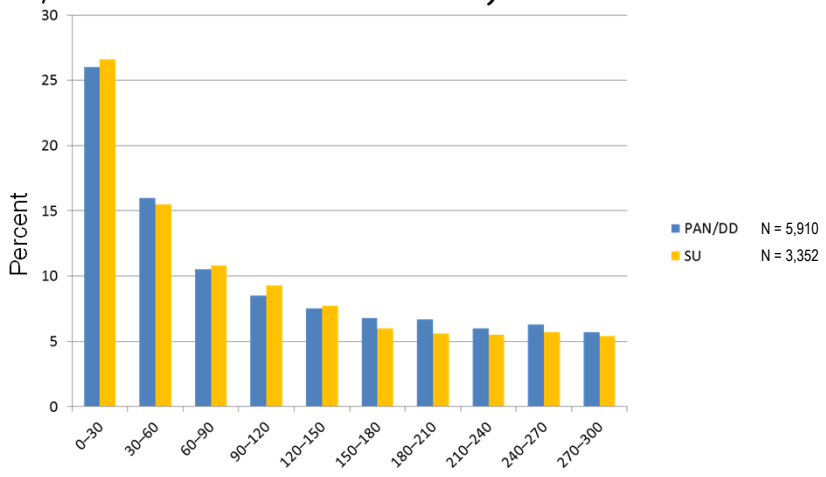
11

Health monitoring in Austria:
Descriptive statistics – disease frequencies (%)



13

Health monitoring in Austria:
occurence of claw diseases within lactation
(in %, across lactations and breeds)



14

Health monitoring in Austria:
Routine genetic evaluation (Fuerst et al., 2011)

- Since December 2010, 3 times a year
- Part of joint Austrian/German evaluation
- Currently Fleckvieh only
- **Traits:**
  - Mastitis
  - Early reprod.disorders
  - Cystic ovaries
  - Milk fever

15

Claw health data

- 306,060 records of 150,503 Fleckvieh cows, years 2007 – 2012
- Validated according to routine genetic evaluation
- Diagnoses panaritium, dermatitis digitalis (mortellaro), sole ulcer, white line disease
- **Claw disorder** defined as **binary trait**: whether or not a cow was at least **once treated** for either of these diseases (-10 to 300 days after calving + disposals feet and legs until 200 days)

16

Health data: Frequencies

Trait	N	Frequency (%)
Claw disorder	305,060	4.0
Mastitis	291,913	9.5
Early reprod.	329,073	4.8
Cystic ovaries	286,721	5.2
Milk fever	336,138	2.3

18

Genetic analysis: Model

- Effects according to **routine genetic evaluation**:
  - parity*age at calving (F)
  - year*month (F)
  - type of recording*year (F)
  - herd*year (R)
  - permanent environment (R)
  - genetic animal effect (R)
- 427,840 animals in pedigree
- single trait linear BLUP AM (VCE 6, Groeneveld et al., 2010)

19

Genetic analysis: Results

Trait	N	h2	SE
Claw disorder	305,060	**.024**	.003
Mastitis[1]	41,149	**.020**	.005
Early reprod.[1]	45,869	**.023**	.005
Cystic ovaries[1]	40,468	**.046**	.006
Milk fever[1]	46,824	**.036**	.006

[1] Fuerst et al., 2011

21

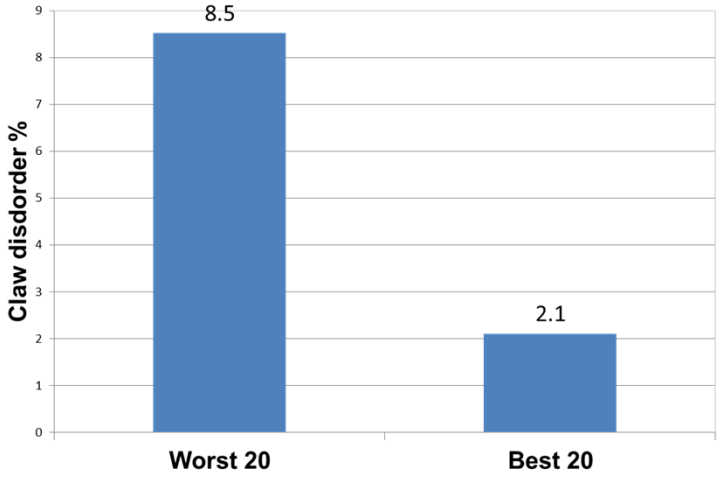
Breeding value estimation

- Software **MiX99** (Lidauer et al., 2008)
- Mean 100, SD 12, **higher values favourable**
- Single trait linear BLUP AM, model as routine genetic evaluation
- Breeding value correlations to selected traits

22

Breeding value estimation

(419 bulls, R^2>=50, min 20 daughters, max 12.5% foreign genes)



23

Breeding value estimation

Relationship to other traits (EBV rank corr., 419 bulls (R^2=>50, min 20 daughters, max 12.5% foreign genes)

Trait	Claw disorder
Total merit index	.09
Milk kg	.03
Fitness index	**.19**
Longevity	**.33**
Persistency	.01
Frame score	**-.21**
Feet and legs score	**.18**
Hocks	**.11**
Pasterns	.07

24

Conclusions and summary

- **Frequencies** of claw diseases **rather low**: vets only called in severe cases
- **Heritability** in the range of other health traits
- Synergistic relationship to longevity and feet and legs score, antagonistic relationship to frame score
- Claw data from health monitoring may be **utilized** for **genetic evaluation**

25

Outlook

- **Farmers' observations** may already be recorded in central data base
- Claw trimming records could be a **valuable source of data** regarding claw health
- Genetic analyses of these observations and investigation of **usability as auxiliary traits** planned

26