



ZuchtData
EDV-DIENSTLEISTUNGEN GMBH



Are milk content traits adequate ketosis indicators?

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Background

- Mobilization of fat and protein in phases of negative energy balance
- Formation of metabolites
- If further metabolization impossible (lack of glucose)

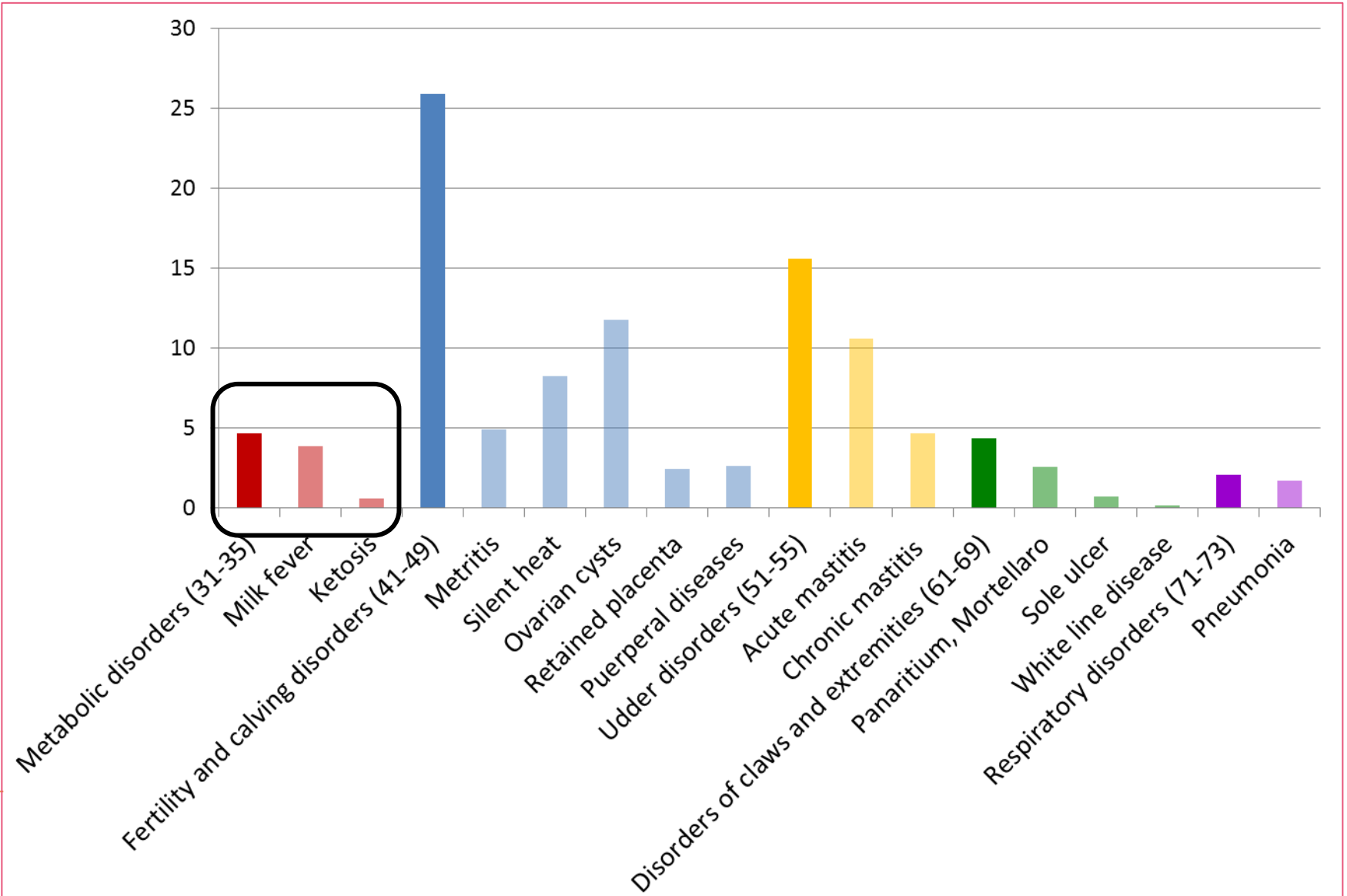
Background

- Mobilization of fat and protein in phases of negative energy balance
- Formation of metabolites
- If further metabolization impossible (lack of glucose)
 - ➔ ketosis; mainly during the first weeks of lactation

Background

- **Routine performance recording** in Austrian dairy cows
 - fat, protein, lactose, urea contents
 - ratios: fat/protein, fat/lactose
- **Direct health data** available – ketosis is a separate code in Austrian health monitoring
- **Frequency** of disease however **low** (especially in early lactations)

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



Aims

- **When** does ketosis usually occur?
- **Relationship** between **ketosis** and milk **contents** as well as their **ratios**?
 - is the frequently used **fat/protein ratio** and its threshold of 1.5 an **adequate indicator**?
 - better indicators?
 - differences between breeds?



Data

- 40.600 dairy cows (Fleckvieh, Brown Swiss, Friesian) in 1400 farms with reliable health monitoring
- Years 2006-2010
- First test day records (milk contents, ratios)
- ~ 50% of cows with test day record until ketosis diagnosis!

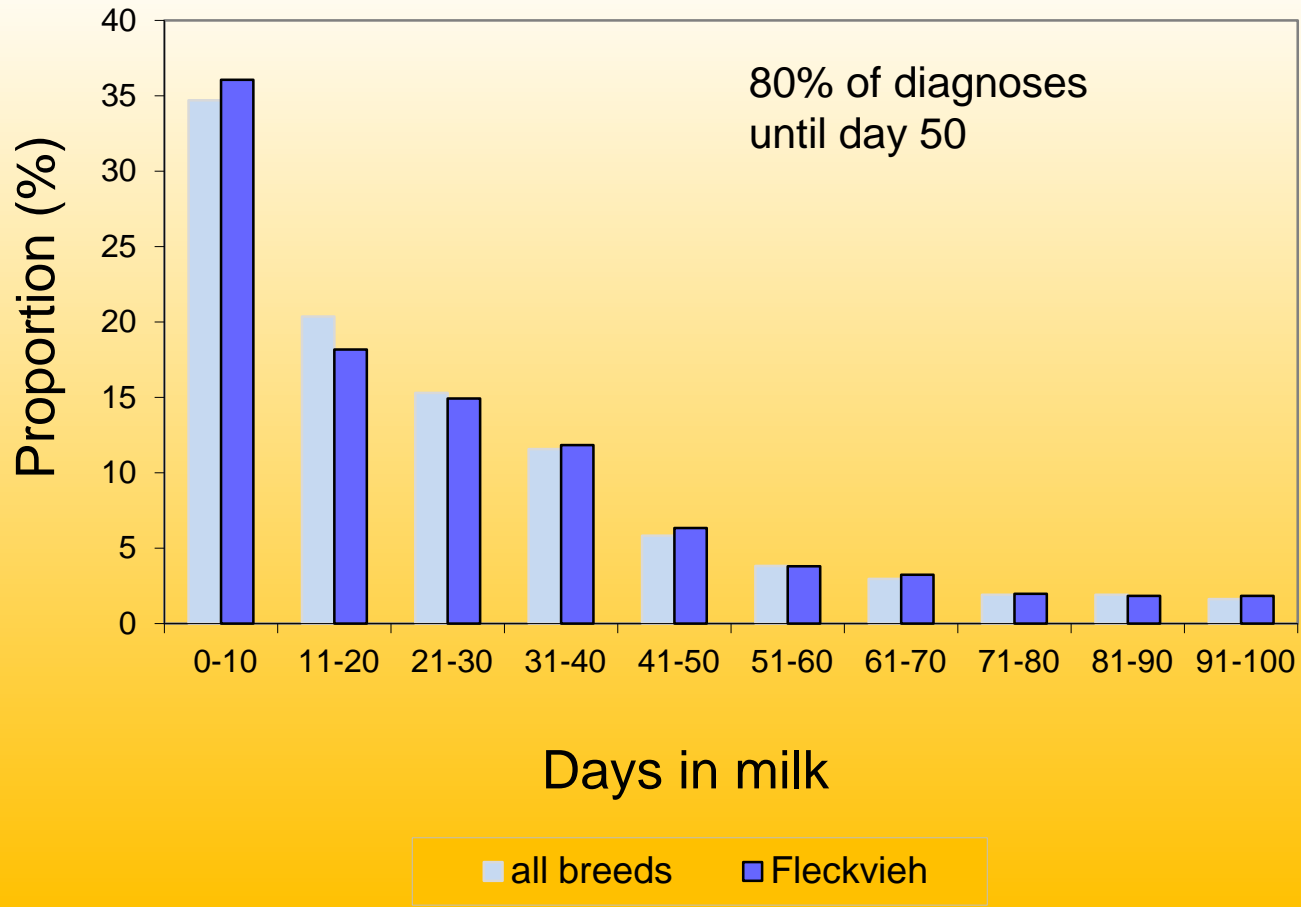


Analyses

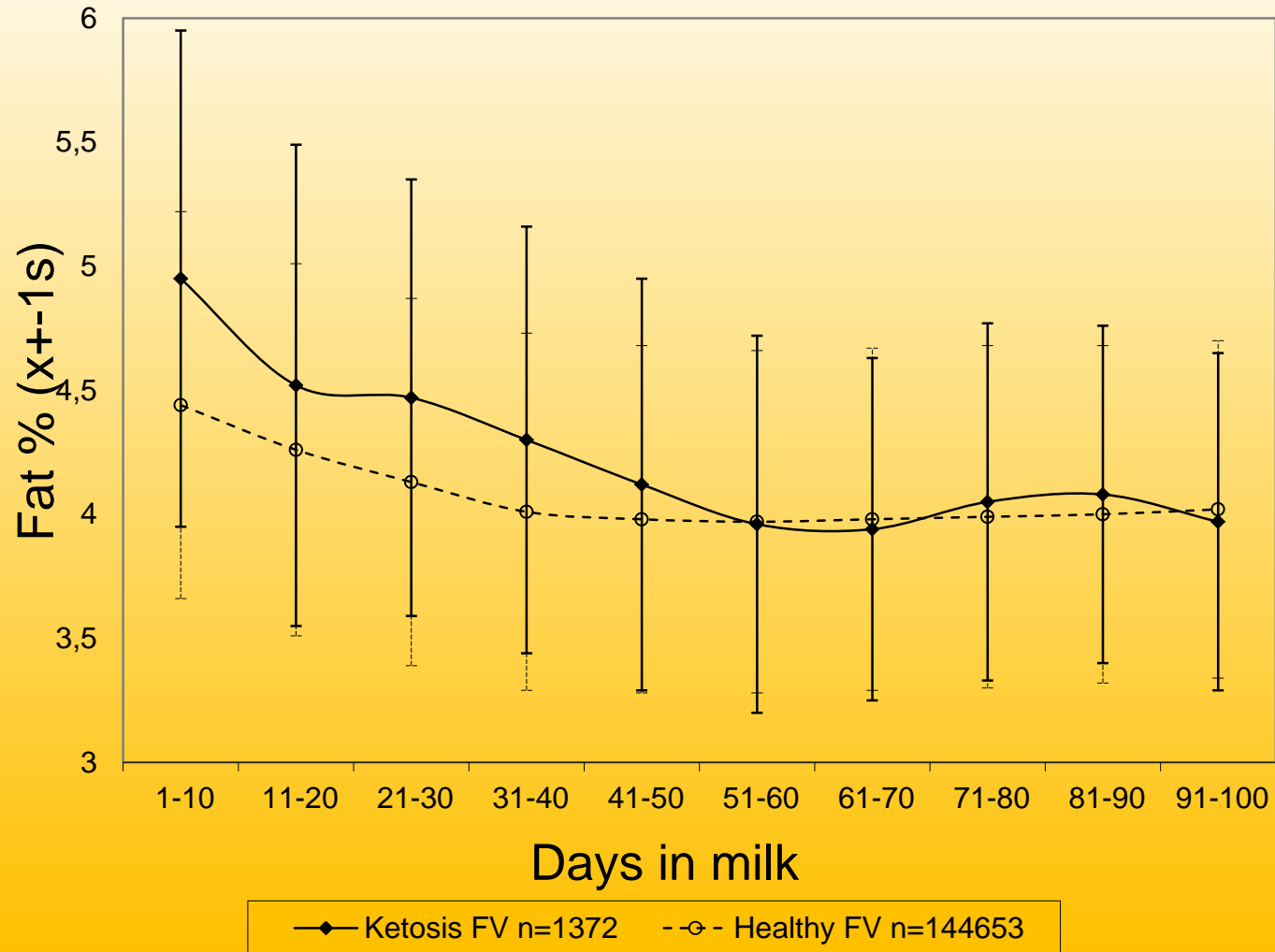


- SAS 9.2
- Descriptive analyses across breeds and within Fleckvieh
- Analysis of variance for **fat-protein ratio**; effects diagnosis (yes, no), breed, farm, breed*diagnosis, lactation (1-10+), foreign gene %, day of lactation (linear, squared)
- Analysis of variance for all **content** traits (FV)

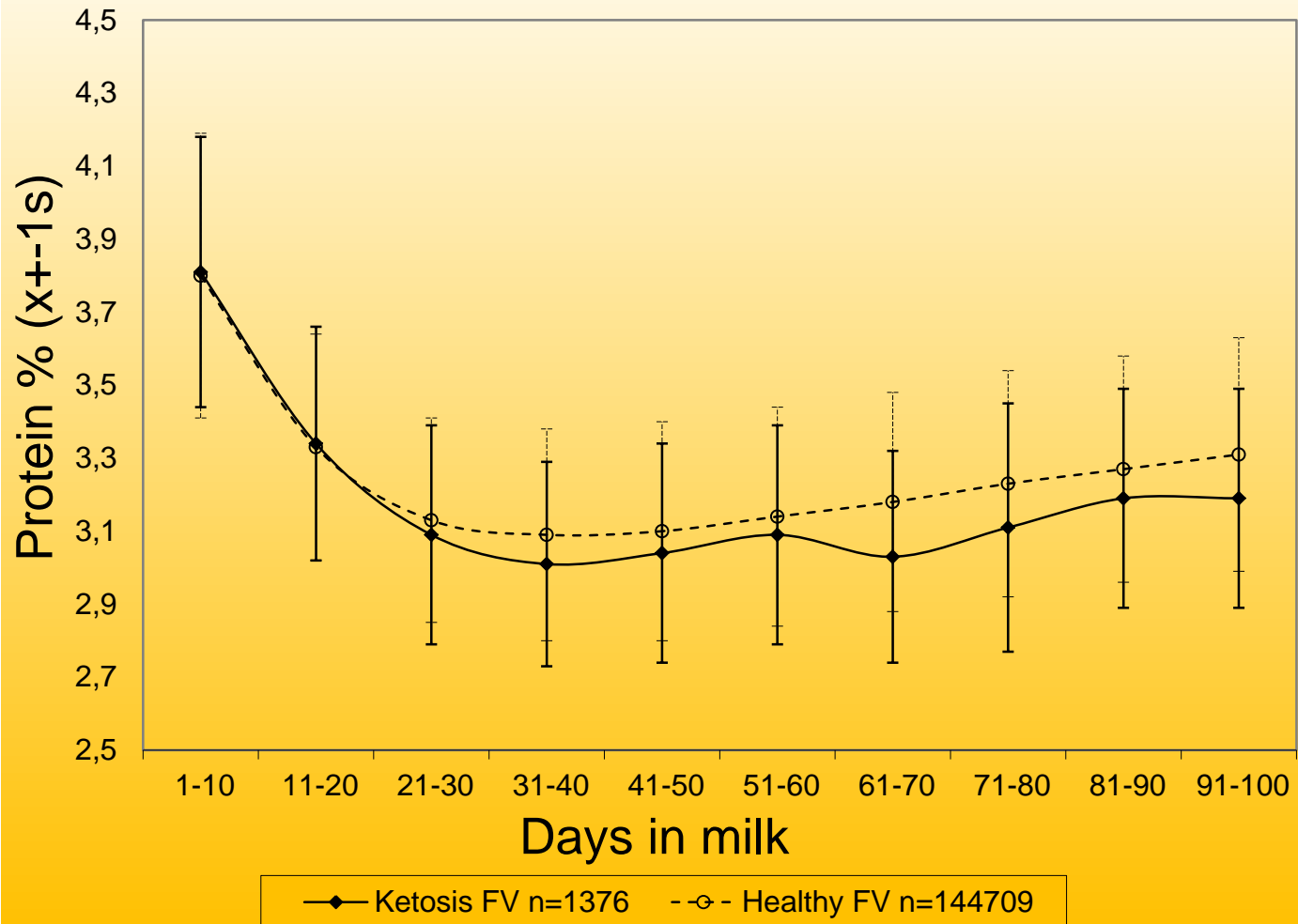
When does ketosis mainly occur?



Fat content during lactation



Protein content during lactation



Fat-protein ratio (FPR) - all breeds

	Ketosis (Diagnosis*Breed)					
	FV N=59,693		BS N=9,872		HF+RF N=6,214	
	no	yes	no	yes	no	yes
FPR (LSM)	1.28^a	1.46^d	1.31^b	1.52^{de}	1.38^c	1.63^e

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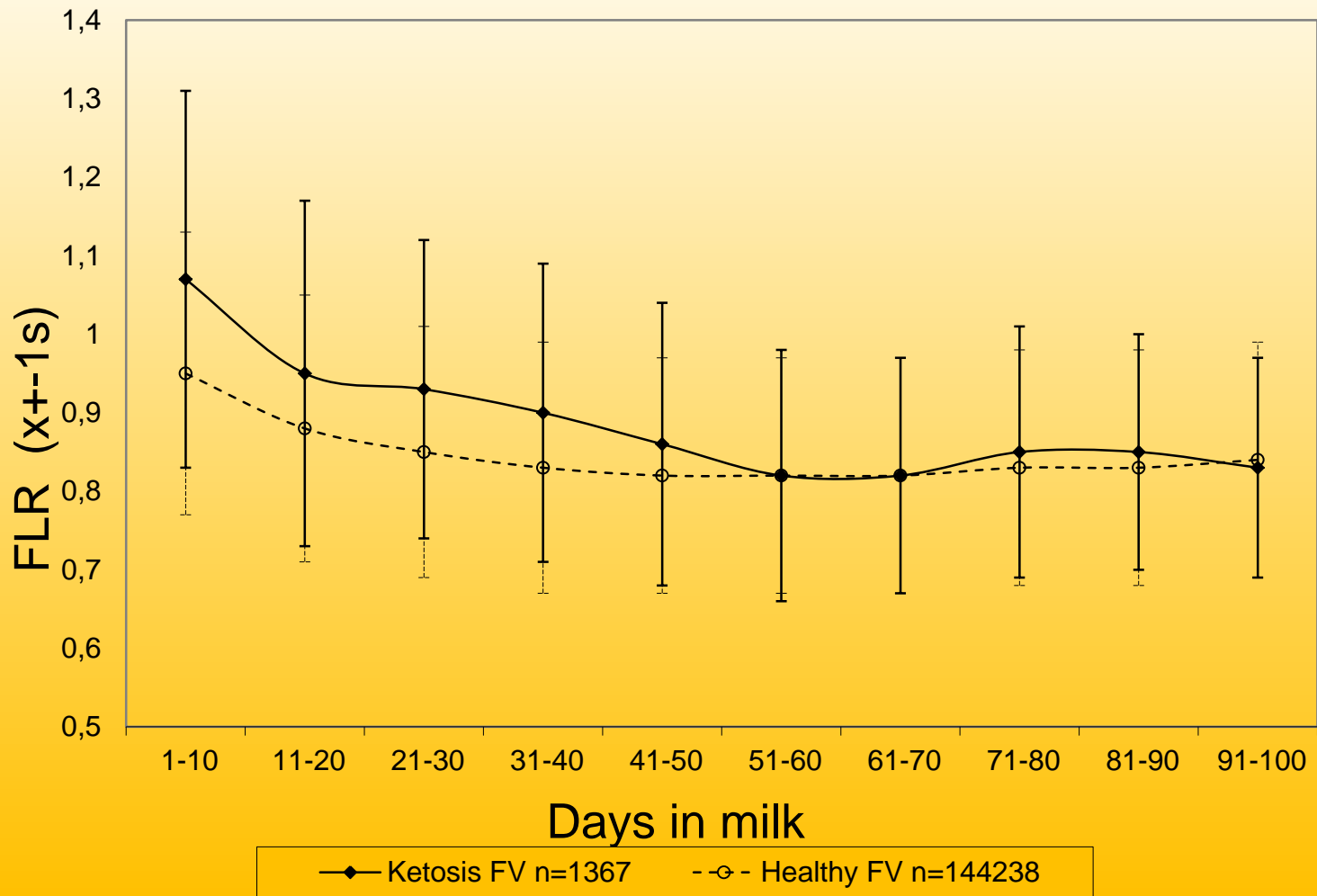
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FPR < 1.5 (%)	82	58	81	58	71	34
FPR < 1.33 (%)	61	39	62	33	48	19

Only 42% correctly assigned!

Results Fleckvieh

Trait – LS Mean	Ketosis no	Ketosis yes	P
Fat content (%)	4.18	4.69	***
Protein content (%)	3.27	3.22	*
Lactose (%)	4.83	4.80	*
F/P Ratio	1.29	1.48	***
F/L Ratio	0.87	0.99	***

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	FV N=59,693		BS N=9,872		HF+RF N=6,214	
	no	yes	no	yes	no	yes
FLR (LSM)	0.87 ^a	0.99 ^c	0.89 ^b	1.02 ^c	0.90 ^b	1.11 ^d
FLR < 0.9 (%)	63	33	58	34	57	14

Conclusions

- **Frequency** of ketosis **low** in all breeds
- **Early occurrence** in lactation – routine milk recording only available for ~ 50% of cows
BUT: clear relationship to several traits
- **Fat-protein ratio** and its threshold of 1.5 is questionable for Fleckvieh and Brown Swiss
- **Alternative** – lower threshold value (1.33?) or fat-lactose ratio



Thank you for your attention

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
- 27 andere Erkrankungen der Bauchhöhle
- 28 Erkrankungen der Maulhöhle
- 29 Erkrankungen der Speiseröhre

Stoffwechselkrankheiten

- 31 Gebärparese, Hypocalcämie
- 32 Tetanie
- 33 Azetonämie
- 34 andere Stoffwechselkrankheiten
- 35 Vergiftungen

Fruchtbarkeits-u. Abkalbest.

- 41 Gebärmutterentzündung
- 42 Stillbrunst, Azyklie
- 43 Ovarialzysten
- 44 Scheidenvorfall
- 45 Abortus und andere Störungen der Gravidität
- 46 Schweregeburt
- 47 Geburtsverletzungen
- 48 Nachgeburtshaltung
- 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 Gliedmaßenkrank.

- 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

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

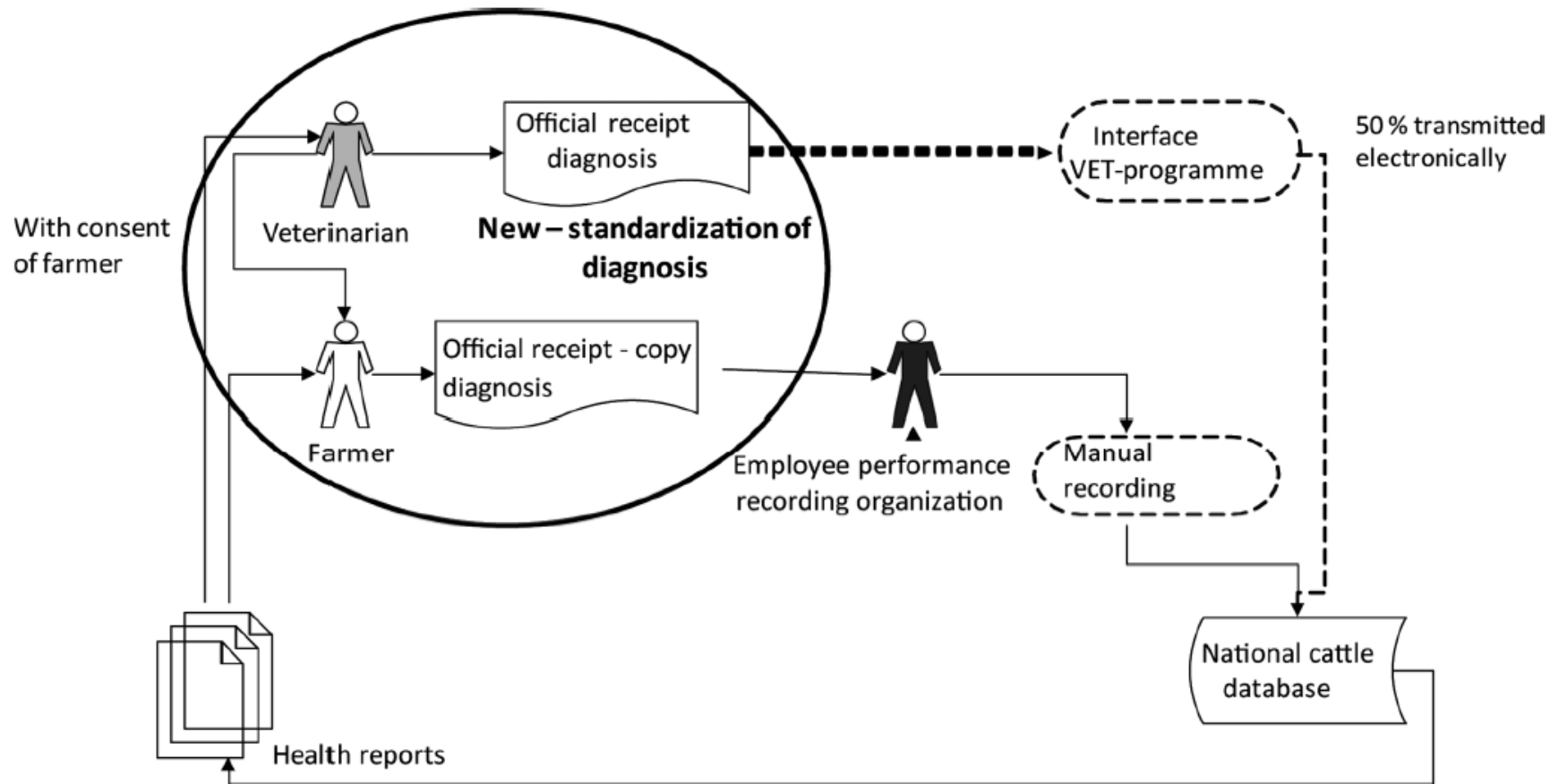


Figure 1. Recording of diagnostic data. VET = vocational education and training.