IT-Solutions for Animal Production

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Animal Production

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Use of Data Warehouse in Animal Husbandry and Animal Breeding

Dr. Reinhard Reents, Dr. Benno Waurich, Marko Witt
IT solutions for Animal Production (vit), Verden/Germany

Germany: Data processing in dairy cattle

- Traditionally some organizations processed their ‘own’ data in house
  - Some share software development, run it on different sites

- In the Holstein regions most organisations have joined forces in their data centre **vit**:
  - 12 breed organisations with dairy breeds (100%)
  - 9 milk recording associations (75% of all Holstein cows recorded)
  - 8 A.I. organizations
  - Luxembourg (CONVIS) processes data at **vit**, too
  - All regions (incl. LUX, AUT) → genetic and genomic evaluation for dairy breeds

- On farm data increasingly important
  - Average herdsize
    - Eastern Germany: 260 cows
    - North-Western Germany: 75 cows
  - Since 1997 50% share of a specialised company (VIT-PCS) providing on farm herd management software (‘*Herde*’) → 70% market share

vit: the organisation

vit = Vereinigte Informationssysteme Tierhaltung w.V.

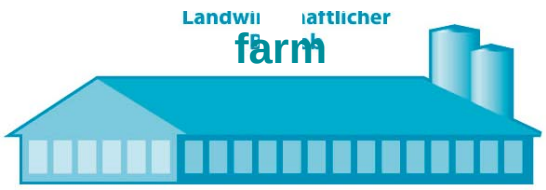
(IT solution for Animal Production)

- Organized as association (non-profit)
  - Founded 1965 in Western Germany (Verden) immediatedly as a private organisation
  - Founded 1965 in Eastern Germany (Paretz near Berlin) as state organisation → 1990 privatisation, 1994 merger to vit with Western Germany
  - Members are agricultural organizations from Germany and Luxembourgh

- Most important sector is dairy breeds (ca. 50 % of turnover) including:
  - Data processing for milk recording → 1.700.000 cows
  - Data processing for herdbook keeping → 1.800.000 cows
  - Data processing for artificial insemination → 2.650.000 inseminations
  - Genetic and genomic evaluation

- Financing
  - 95% service fees
  - 3% development grants
  - 2% member fees

Services for dairy breeding in summary



Milk recording
Registration

Classification
Animal sales

A.I. service
natural service

Identification

Milk recording organization

Herd-Book association

A.I. stud

Monthly report
Yearly report

Pedigee info
Sales info

A.I. data
Accounting data

Authority respons. for I&R

Identification

vit


Genom data


Performance data


Pedigree data


Mating data


Accounting data


Breeding values

Use of this huge, komplex data pool with ~ 800 users

- Joint data pool (~80 mio animals) enables all clients to have optimal data quality
  - Immediate cross checks even with movements across regions possible
  - Corrections of data content immediatedly available

But

1. How to share sensitive data → solved by access rights to the database

2. How to integrate additional data (eg ERP) with the data that belongs to animals / farms

3. Individual queries / requests / reports on the ‚own' data set, for
   - R&D work
   - Few herds

   - Solutions so far
     a. Individual software tools developed by vit
     b. extract of data and analysis with tools within the organisation

Migration process

- Analysis showed that future needs require IT architecture which is close to Internet application → migration from mainframe to new plattform

  Other main aspects

  → new (young) staff expect grafical front end

  → availability of programmers (no PL1, Natural, etc. any more)

  Solution

  - Linux operating system
  - Oracle database
  - Java software development

- Experience showed that software development with Java is only slightly ‚cheaper' than with previous languages

- Problem remains that for ad hoc questions of individual customers the complex database and complex data structures is a challenge

  Solution

  - **Integration of a Data Warehouse**

Data Warehouse (DWH)

- Is an IT system that
  - **E**xtracts, **T**ransform, **L**oads complex source data into a

    dimensional data store
  - And then supports and implements

    querying and analysis

    for the purpose of decision making
- Compared to other means (HQL, SQL) to extract information from complex data structures the use of a DWH does **not require this expert know how**

  → moves decision support systems from the IT department to the users / responsible staff
- The in memory technology guarantees high performance

→ vit has chosen QlikView as the reporting and analysing tool

analysis and output
vit / members and customers

vit-departments develop applications

vit analysis server

timed data updates

integration of external customer data possible

specific data marts

health data and test herds features

Milk recording and annual accounts

Artificial inse-mination billing

...other applications

DWH-customer

... more

ETL-process (Extraktion, Transformation, Load)

Data Warehouse (DWH)
(Replikation serv.it RIND)

serv.it RIND
(operational System)

further operative sytems and databases...

vit database server

Case study 1

- Contract herds for use as cow reference population

  - Two regions in Eastern Germany record additional health and performance data
    - 87 herds (av. herdsize 700 cows) → ~ 60.000 cows
    - Disease diagnoses
    - Weight at calving
    - Hoof trimming
    - Conformation on all heifers
    - ...

  aims:

  a. Have an optimal infrastructure for R&D questions to use data in genomic evaluation
  b. Quarterly reports to farms (for management decisions → motivation to collect data for a continuous period)

     → front end to the farmer

Case study 1 → report to farms (health data)

Quartalsbericht: Calving Trails

Verband: RMV | Betrieb: | Zeitraum: Okt-Dez 2013

Kalbungen gesamt

Merkmal	Quartal	Vorquartal	RBB Quartal	RMV Quartal	Rangierung RMV
Anzahl (n)	792	826	9.926	7.186	
Totgeburten (%)	6,4	8,8	6,1	6,5	
KV schwer (%)	6,2	5,4	3,6	7,0	
Geburtsgewicht (kg)	44,3	43,3	41,7	42,3	

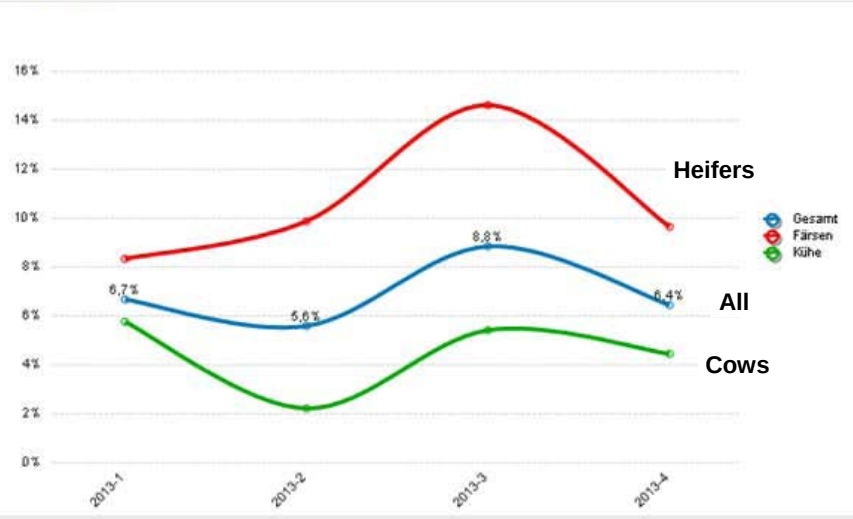
Färsenkalbungen

Merkmal	Quartal	Vorquartal	RBB Quartal	RMV Quartal	Rangierung RMV
Anzahl (n)	301	308	3.193	2.419	
Totgeburten (%)	9,6	14,6	9,4	10,5	
KV schwer (%)	12,0	9,1	4,7	10,4	
Geburtsgewicht (kg)	42,4	41,1	39,6	40,2	

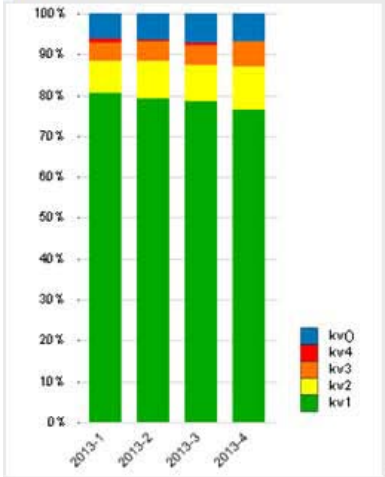
Kuhkalbungen

Merkmal	Quartal	Vorquartal	RBB Quartal	RMV Quartal	Rangierung RMV
Anzahl (n)	491	518	6.733	4.767	
Totgeburten (%)	4,5	5,4	4,5	4,4	
KV schwer (%)	2,6	3,3	3,1	5,2	
Geburtsgewicht (kg)	45,3	44,5	42,7	43,3	

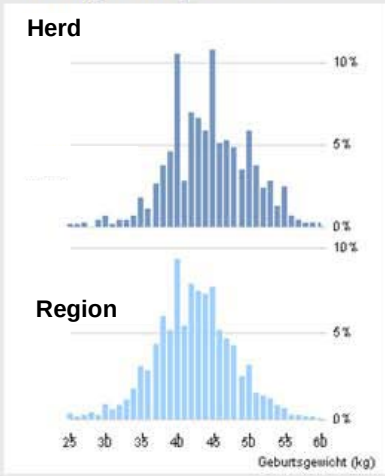
% Stillbirth



Calving Ease



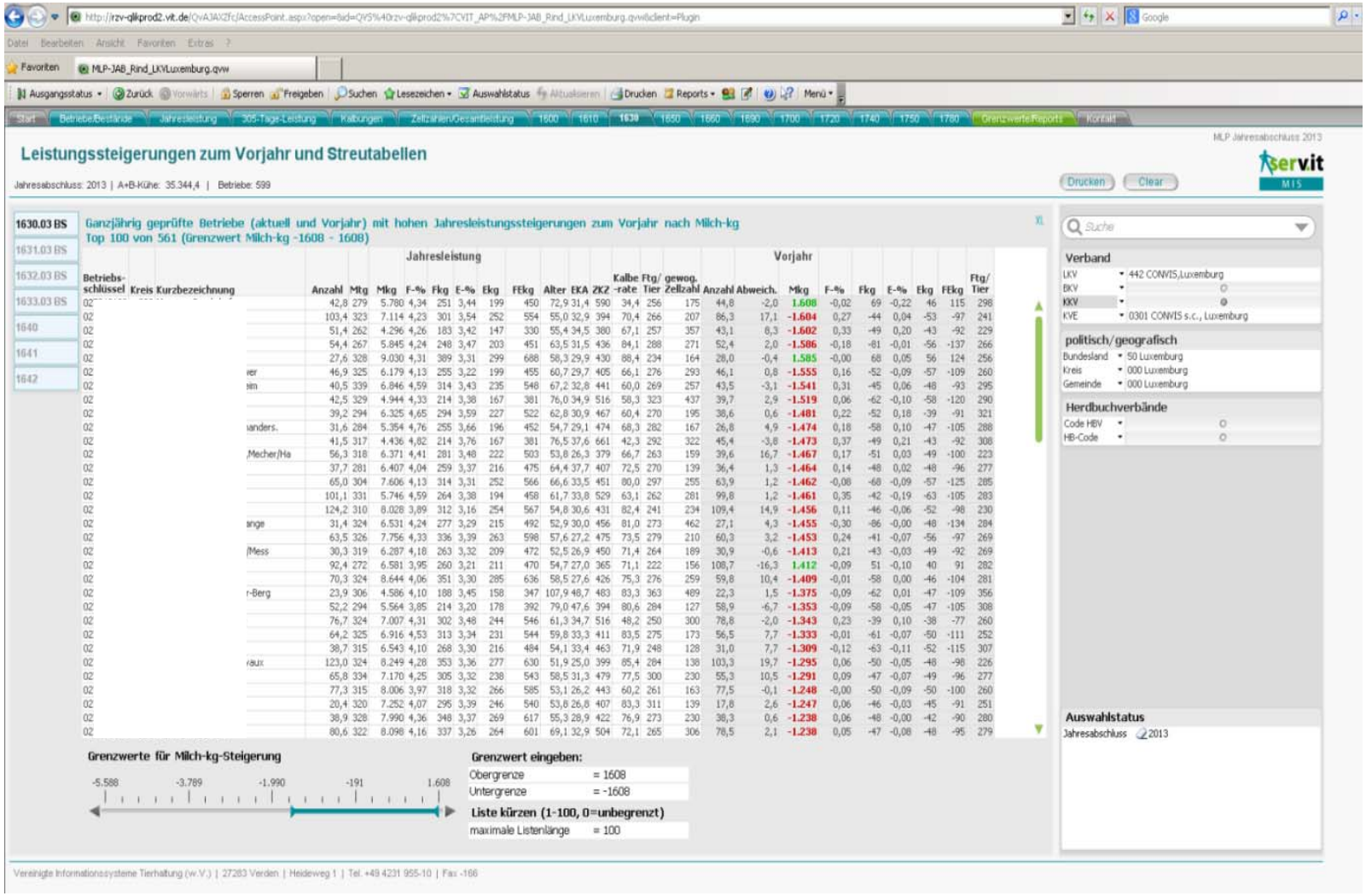
Birth Weight



Case study 2

- Statistics within DHI organisation
  - Once a year an annual report is provided to each farmer
  - Numerous statistics for the individual DHI organisation
    - So far relative static reports
  - Estimation to programe these in Java
  - Estimation to do it with the DWH (20% of ressources Java)
  - Clear advantage for the DWH solution to get the standard reports
  - Now additional (in house) analysis of data is possible
    - Requires training in using the DWH but no special IT know how

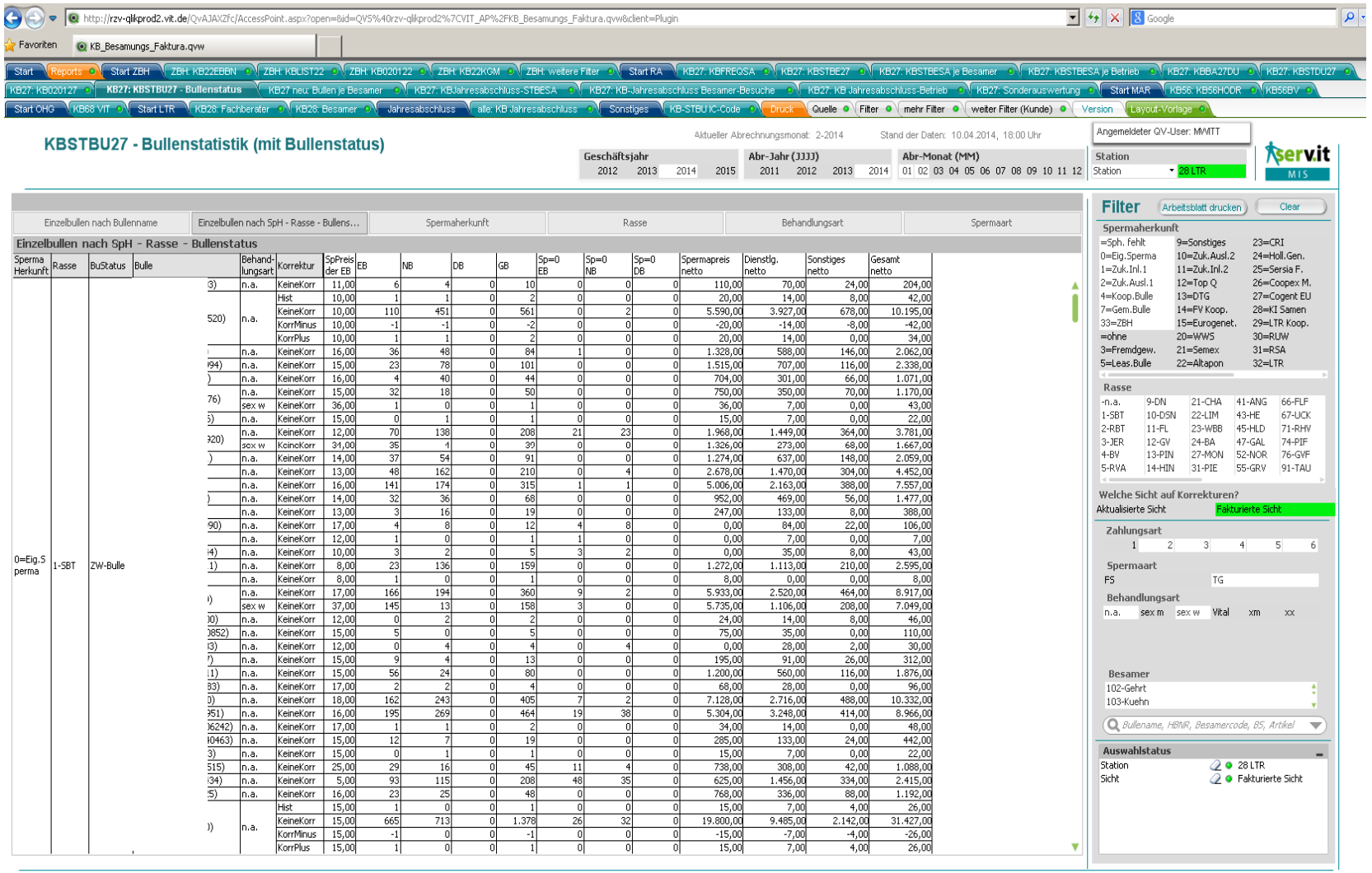
Case study 2 → DHI report



Case study 3

- Larger AI centres use IT system of vit for all of their AI data processing
  - Lab → semen storage etc. → distribution → recording → accounting
  - DWH application is a very powerful tool to analyse this data for various purposes

Case study 3 → use within AI centre



KBSTBU27 - Bullenstatistik (mit Bullenstatus)

Aktueller Abrechnungsmonat: 2-2014 Stand der Daten: 10.04.2014, 18:00 Uhr

Einzelbullen nach Bullenname | Einzelbullen nach SpH - Rasse - Bullens... | Spermaherkunft | Rasse | Behandlungsart | Spermaart

Einzelbullen nach SpH - Rasse - Bullenstatus

Sperma Herkunft	Rasse	BuStatus	Bulle	Behandlungsart	Korrektur	SpPreis der EB	EB	NB	DB	GB	Sp=0 EB	Sp=0 NB	Sp=0 DB	Spermapreis netto	Dienstlg. netto	Sonstiges netto	Gesamt netto
0=Eig.Sperma	1-SBT	ZW-Bulle	3)	n.a.	KeineKorr	11,00	6	4	0	10	0	0	0	110,00	70,00	24,00	204,00
			520)	n.a.	Hist	10,00	1	1	0	2	0	0	0	20,00	14,00	8,00	42,00
					KeineKorr	10,00	110	451	0	561	0	2	0	5.590,00	3.927,00	678,00	10.195,00
					KorrMinus	10,00	-1	-1	0	-2	0	0	0	-20,00	-14,00	-8,00	-42,00
					KorrPlus	10,00	1	1	0	2	0	0	0	20,00	14,00	0,00	34,00
				n.a.	KeineKorr	16,00	36	48	0	84	1	0	0	1.328,00	588,00	146,00	2.062,00
			94)	n.a.	KeineKorr	15,00	23	78	0	101	0	0	0	1.515,00	707,00	116,00	2.338,00
			)	n.a.	KeineKorr	16,00	4	40	0	44	0	0	0	704,00	301,00	66,00	1.071,00
				n.a.	KeineKorr	15,00	32	18	0	50	0	0	0	750,00	350,00	70,00	1.170,00
			76)	sex w	KeineKorr	36,00	1	0	0	1	0	0	0	36,00	7,00	0,00	43,00
			5)	n.a.	KeineKorr	15,00	0	1	0	1	0	0	0	15,00	7,00	0,00	22,00
				n.a.	KeineKorr	12,00	70	138	0	208	21	23	0	1.968,00	1.449,00	364,00	3.781,00
			20)	scx w	KeincKorr	34,00	35	4	0	39	0	0	0	1.326,00	273,00	68,00	1.667,00
			)	n.a.	KeineKorr	14,00	37	54	0	91	0	0	0	1.274,00	637,00	148,00	2.059,00
				n.a.	KeineKorr	13,00	48	162	0	210	0	4	0	2.678,00	1.470,00	304,00	4.452,00
				n.a.	KeineKorr	16,00	141	174	0	315	1	1	0	5.006,00	2.163,00	388,00	7.557,00
			)	n.a.	KeineKorr	14,00	32	36	0	68	0	0	0	952,00	469,00	56,00	1.477,00
				n.a.	KeineKorr	13,00	3	16	0	19	0	0	0	247,00	133,00	8,00	388,00
			90)	n.a.	KeineKorr	17,00	4	8	0	12	4	8	0	0,00	84,00	22,00	106,00
				n.a.	KeineKorr	12,00	1	0	0	1	1	0	0	0,00	7,00	0,00	7,00
			4)	n.a.	KeineKorr	10,00	3	2	0	5	3	2	0	0,00	35,00	8,00	43,00
			1)	n.a.	KeineKorr	8,00	23	136	0	159	0	0	0	1.272,00	1.113,00	210,00	2.595,00
				n.a.	KeineKorr	8,00	1	0	0	1	0	0	0	8,00	0,00	0,00	8,00
			)	n.a.	KeineKorr	17,00	166	194	0	360	9	2	0	5.933,00	2.520,00	464,00	8.917,00
				sex w	KeineKorr	37,00	145	13	0	158	3	0	0	5.735,00	1.106,00	208,00	7.049,00
			0)	n.a.	KeineKorr	12,00	0	2	0	2	0	0	0	24,00	14,00	8,00	46,00
			3852)	n.a.	KeineKorr	15,00	5	0	0	5	0	0	0	75,00	35,00	0,00	110,00
			3)	n.a.	KeineKorr	12,00	0	4	0	4	0	4	0	0,00	28,00	2,00	30,00
			)	n.a.	KeineKorr	15,00	9	4	0	13	0	0	0	195,00	91,00	26,00	312,00
			1)	n.a.	KeineKorr	15,00	56	24	0	80	0	0	0	1.200,00	560,00	116,00	1.876,00
			83)	n.a.	KeineKorr	17,00	2	2	0	4	0	0	0	68,00	28,00	0,00	96,00
			0)	n.a.	KeineKorr	18,00	162	243	0	405	7	2	0	7.128,00	2.716,00	488,00	10.332,00
			951)	n.a.	KeineKorr	16,00	195	269	0	464	19	38	0	5.304,00	3.248,00	414,00	8.966,00
			06242)	n.a.	KeineKorr	17,00	1	1	0	2	0	0	0	34,00	14,00	0,00	48,00
			10463)	n.a.	KeineKorr	15,00	12	7	0	19	0	0	0	285,00	133,00	24,00	442,00
			3)	n.a.	KeineKorr	15,00	0	1	0	1	0	0	0	15,00	7,00	0,00	22,00
			515)	n.a.	KeineKorr	25,00	29	16	0	45	11	4	0	738,00	308,00	42,00	1.088,00
			34)	n.a.	KeineKorr	5,00	93	115	0	208	48	35	0	625,00	1.456,00	334,00	2.415,00
			5)	n.a.	KeineKorr	16,00	23	25	0	48	0	0	0	768,00	336,00	88,00	1.192,00
				n.a.	Hist	15,00	1	0	0	1	0	0	0	15,00	7,00	4,00	26,00
			)		KeineKorr	15,00	665	713	0	1.378	26	32	0	19.800,00	9.485,00	2.142,00	31.427,00
					KorrMinus	15,00	-1	0	0	-1	0	0	0	-15,00	-7,00	-4,00	-26,00
					KorrPlus	15,00	1	0	0	1	0	0	0	15,00	7,00	4,00	26,00

Vereinigte Informationssysteme Tierhaltung (w.V.) | 27283 Verden | Heideweg 1 | Tel. +49 4231 955-439 | Fax -166 http://www.vit.de/

Summary

- Introduction of a Data Warehouse System is a complex project
- Requires large initial investment
  - Technical infrastructure
    - ETL process
    - Server → In Memory Technique
    - Developer licences
    - User licences
  - Training of experts for implementation of projects
    - Analysis of the business rules
    - ETL
    - Development of reports
- Very positive Feedback from those customers that take the time to learn about new features and apply it

Thank you for attention !