

## Praktische toepassing van Big Data en AI in de veehouderij



# Wie we zijn..

- Opgericht in 2012
- Onafhankelijk data platform provider
- Cloud-based real-time data oplossingen voor veeteelt

Data integration & management



Monitoring & control



Risk reduction & optimization

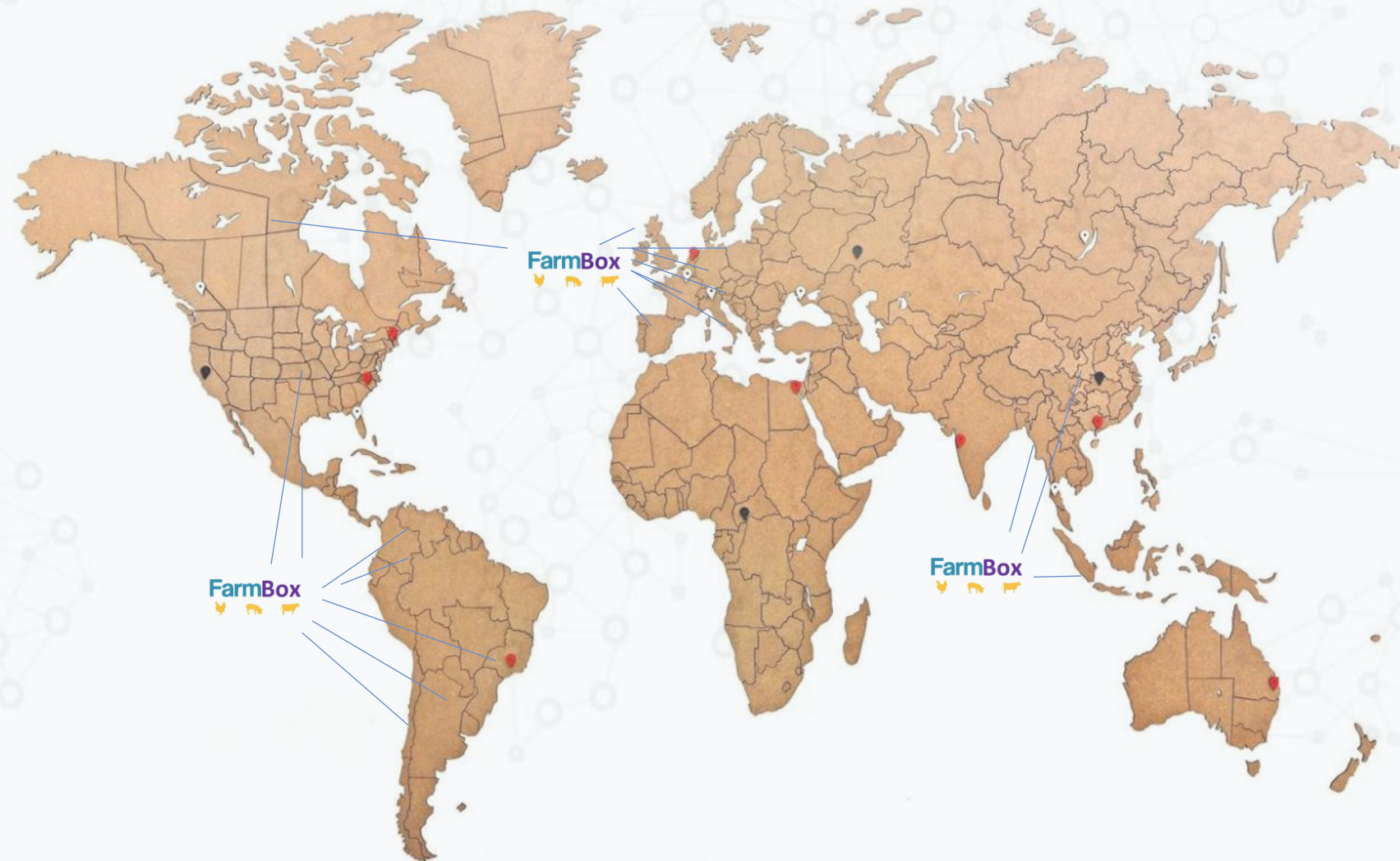


- Jong en flexibel team met ICT & Agri achtergrond
- Focus: optimaal gebruik maken van aanwezige data ten behoeve van verbetering technische, duurzame en financiële doelstellingen

= **Fact-based farming**



Waar we zijn..



# (Big) Data in de veehouderij

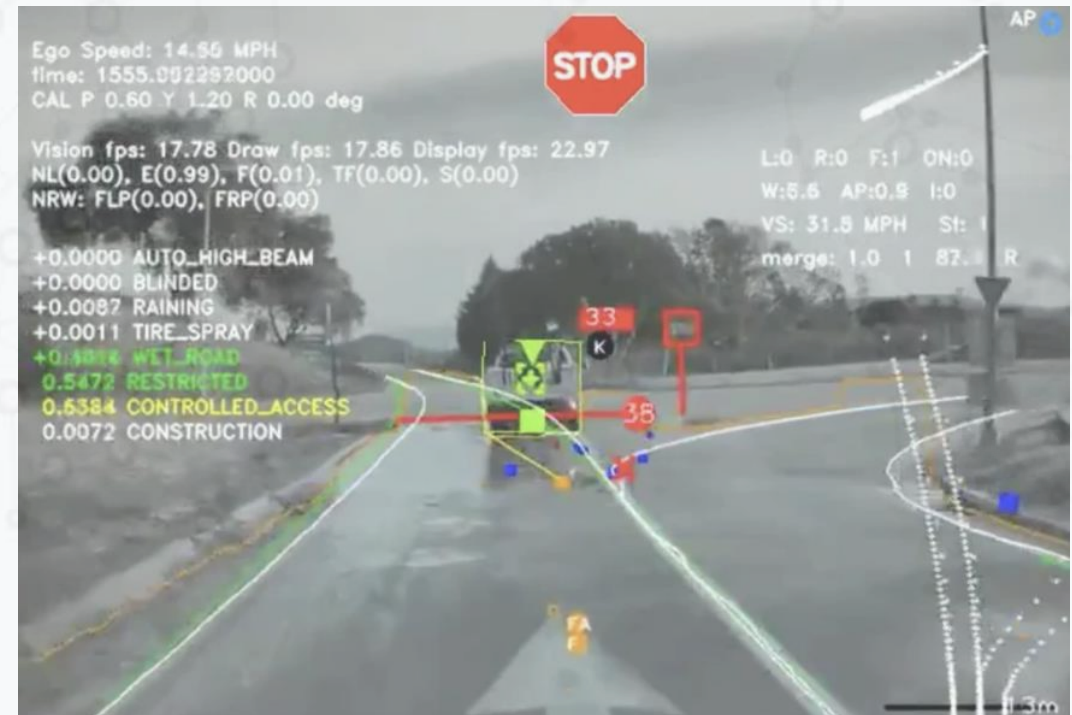
Kentallen



Monitoren



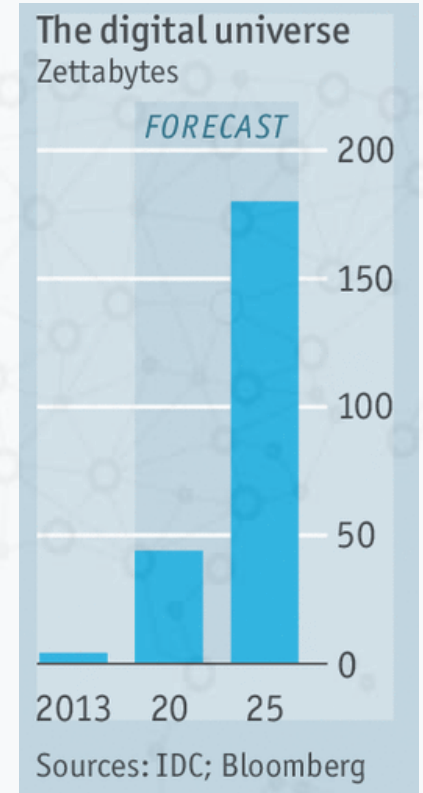
Voorspellen



# BigData

De 4 V's:

- Volume
- Velocity (frequentie)
- Variety (verschillende bronnen)
- Veracity (waarheidsgetrouw)



Min	Max	Mean	SD
4.3	?	5.84	0.83
2.0	4.4	3.05	5000000
15000	7.9	1.20	0.43
0.1	2.5	?	0.76

AI

1997



2011



THINK



ΣΚΕΠΟΥ

DEI

**\$24,000**

Who is Stoker?  
(1 FOR ONE WELCOME OUR  
NEW COMPUTER OVERLORDS)

\$1,000

**\$77,147**

Who is Bram  
Stoker?

\$ 17,973

**\$21,600**

WHO IS  
BRAM STOKER?

\$5600

2015 +



AlphaGo

Lee Sedol







**Perception  
Classification**

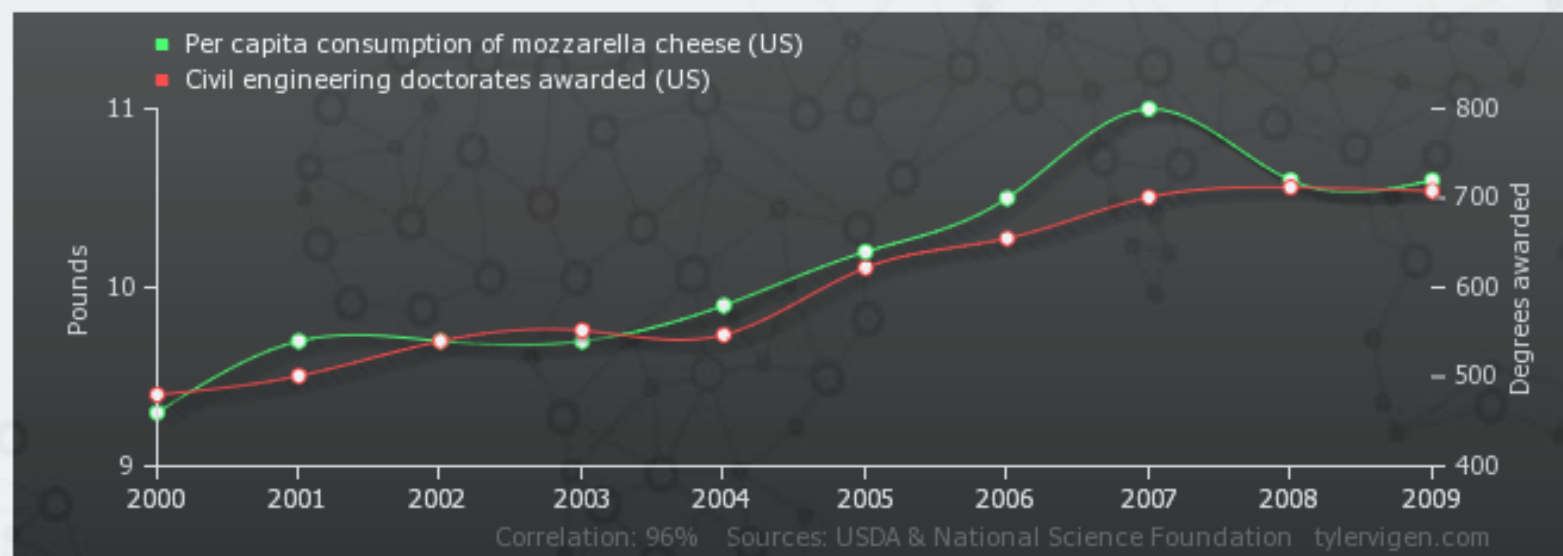
**Reasoning &  
Strategy**

**Observation**

**Memory**

## Bigdata, correlatie - causaal verband

### Per capita consumption of mozzarella cheese (US) correlates with Civil engineering doctorates awarded (US)



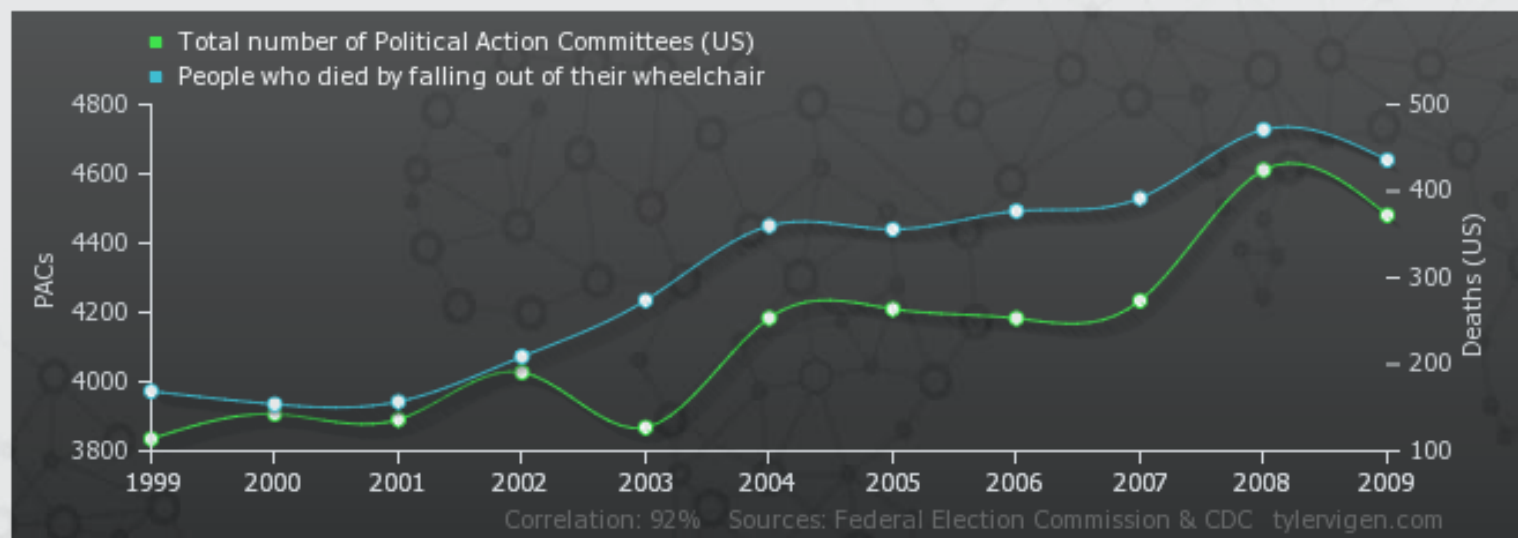
[Upload this chart to imgur](#)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Per capita consumption of mozzarella cheese (US) Pounds (USDA)	9.3	9.7	9.7	9.7	9.9	10.2	10.5	11	10.6	10.6
Civil engineering doctorates awarded (US) Degrees awarded (National Science Foundation)	480	501	540	552	547	622	655	701	712	708

**Correlation: 0.958648**

# big data, correlatie - causaal verband

## Total number of Political Action Committees (US) correlates with People who died by falling out of their wheelchair



[Upload this chart to imgur](#)

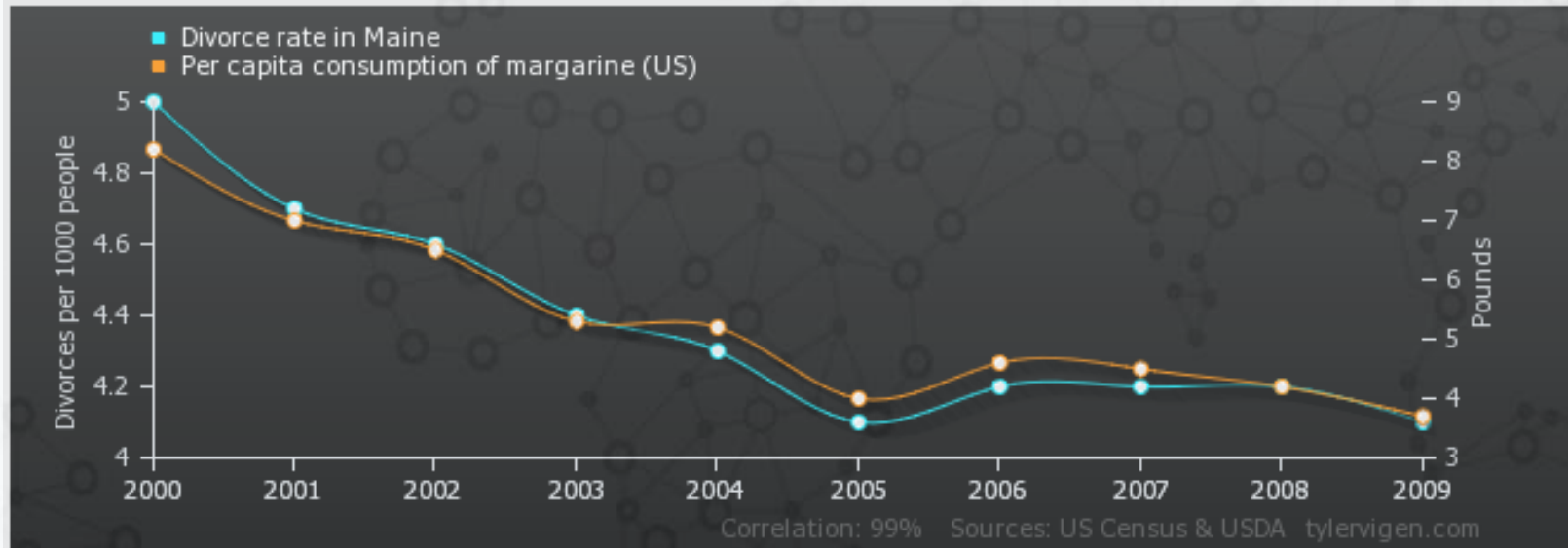
	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
Total number of Political Action Committees (US) PACs (Federal Election Commission)	3,835	3,907	3,891	4,027	3,868	4,184	4,210	4,183	4,234	4,611	4,481
People who died by falling out of their wheelchair Deaths (US) (CDC)	169	154	157	209	274	360	356	377	392	471	436
<b>Correlation: 0.915876</b>											

# big data, correlatie - causaal verband

## Divorce rate in Maine

correlates with

## Per capita consumption of margarine (US)



[Upload this chart to imgur](#)

	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
<i>Divorce rate in Maine Divorces per 1000 people (US Census)</i>	5	4.7	4.6	4.4	4.3	4.1	4.2	4.2	4.2	4.1
<i>Per capita consumption of margarine (US) Pounds (USDA)</i>	8.2	7	6.5	5.3	5.2	4	4.6	4.5	4.2	3.7

**Correlation: 0.992558**

Basis: correcte observatie



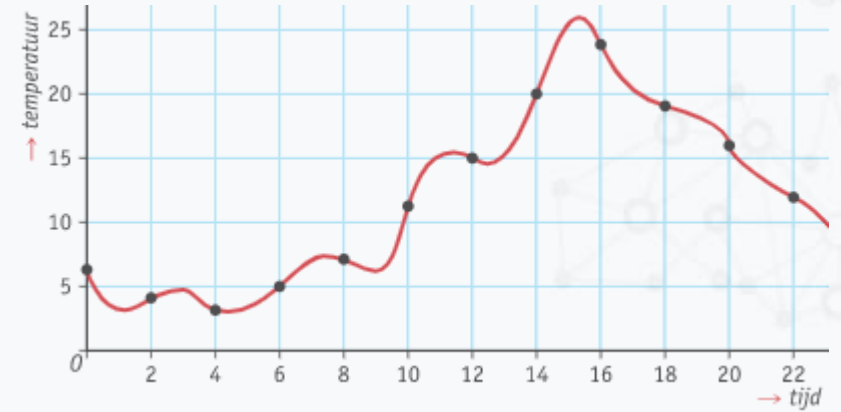
Context: domein kennis



Valide Data



Temperatuur verloop



## Automatische data veehouderij

- Slachtgegevens (EDI)
- Voerleveringen (EDI)
- Staldata:
  - Voer
  - Water
  - Temperatuur
  - RH
  - Gewicht
  - CO2

**Fancom**<sup>®</sup>

 **Hotraco Agri**



**SOMMEN**

**STIENEN** 

**WEDA**<sup>®</sup>



**Big Dutchman.**



**nedap**

livestock management

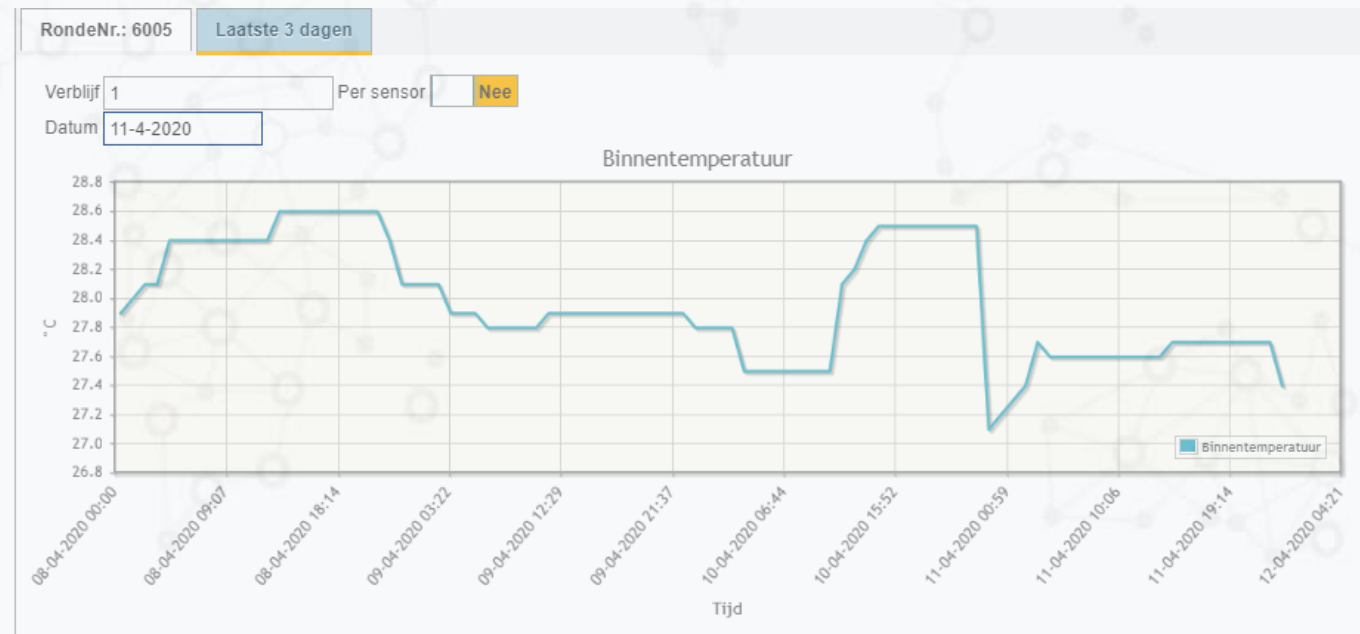
# Staldata veehouderij

Gebruik van data vanuit farm equipment:

- Gekalibreerde sensoren
- Veehouder en installateur waken over werking
- Werking is voorwaarde voor welzijn en performance van de dieren
- Beschikbaar in alle gesloten stal omgevingen

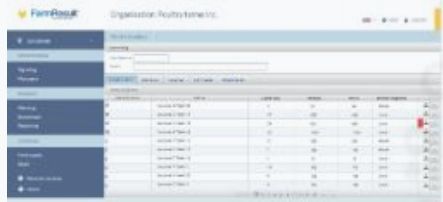
Additionele sensoren:

- Nieuwe metingen (fijnstof, stikstof)
- Vision
- Sound



# IOTCloud

- Real-time data collectie vanuit alle type process equipment
- Afzonderlijke sensoren aan te sluiten (Lora, file, webservice)



- Data collectie slachtgegevens
- Data collective voer en facturen

➔ Plaatsen iedere sensor of meting in de context

(organisatie, locatie, stal, afdeling, hok, koppel of dier)



REST API  
Agroconnect



Optioneel:  
Aanmaken koppel  
identificatie o.b.v

Feed data  
EDI  
REST-API

Slaughterdata  
EDI Slacht  
Autofom

FarmBox

Sensor data



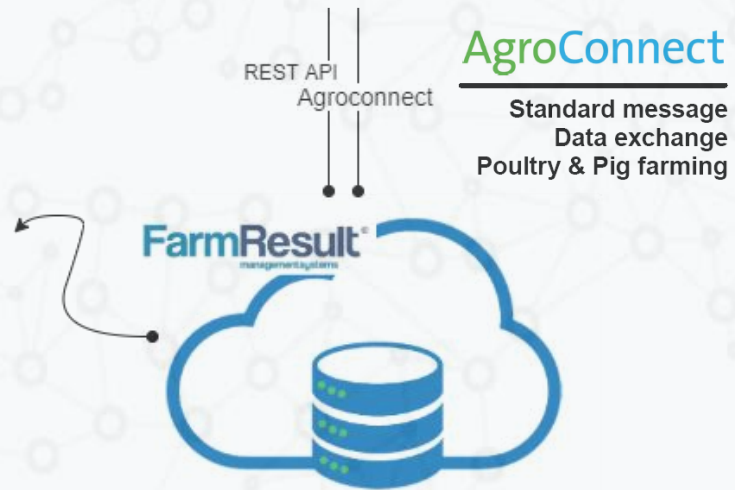
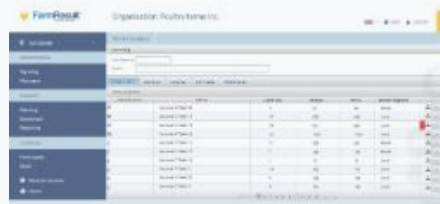
Our libraries have connections with all major equipment suppliers o.a.:





# IOTCloud:

Management system, Keten partijen,  
Dierenartsen, solution partners,  
Wetenschap



Monitoring wie welke  
data gebruikt en  
frequentie

Veehouder is altijd data eigenaar en bepaald wie  
data mag inzien



Our libraries have  
connections with all major  
equipment suppliers o.a.:



# Nu de intelligentie nog

## • Graph Middleware:

- Parallel Prog. Lib.
- Power Optimization
- GPU Optimization

## • Graph Analytics:

- Topological Analysis
- Matching and Search
- Path and Flow

## • Spatiotemporal Analytics:

- Spatiotemporal Mining
- Spatiotemporal Indexing

## • Graph Database:

- Native Store
- GBase

## • Graph Visualization:

- Multivariate Graph
- Dynamic Graph
- Big Graph

## • Machine Learning:

- Deep Learning Tools
- Visual and Text Sentiment Tools
- Anomaly Detection Tools

## • Mobile Cognition:

- iOS Cognition Tools
- Robot Cognition Tools

## • Machine Reasoning:

- Bayesian Networks
- Game Theory Tools
- Multimodal Analysis Platform

### 2. Network Analytics Technologies

### 3. Machine Learning Technologies

### 4. Machine Reasoning Technologies

### 1. Graph Database Technologies





Voorspelling



Voorwaarde

Gebruiker van de oplossing



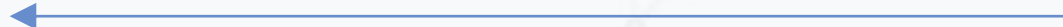
Actie



Doel



(Maatschappelijke) Waarde



Data

# Voorspelling van performance bij vleeskuikens

Doel: beter technische resultaat per stal door bijsturing

Waarde: lager medicijngebruik (\$), betere VC (\$)

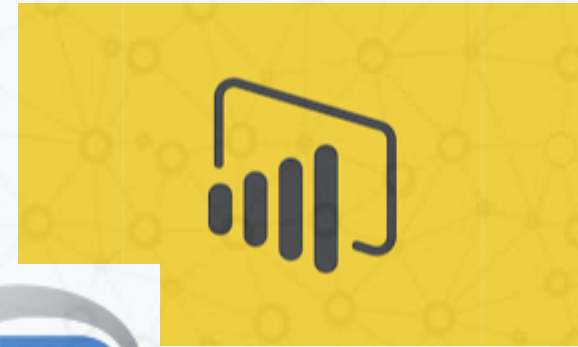
Klein beginnen : 1 locatie met 10 stallen

Dagelijkse bijsturing op basis van model voorspelling

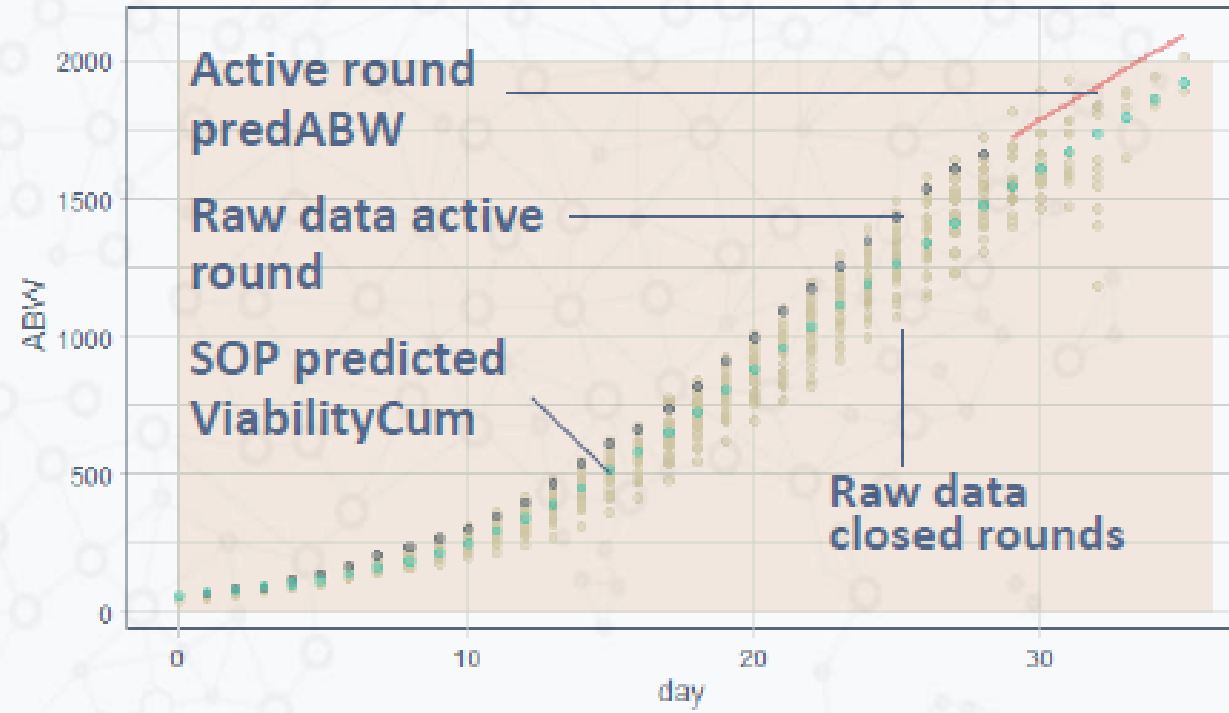
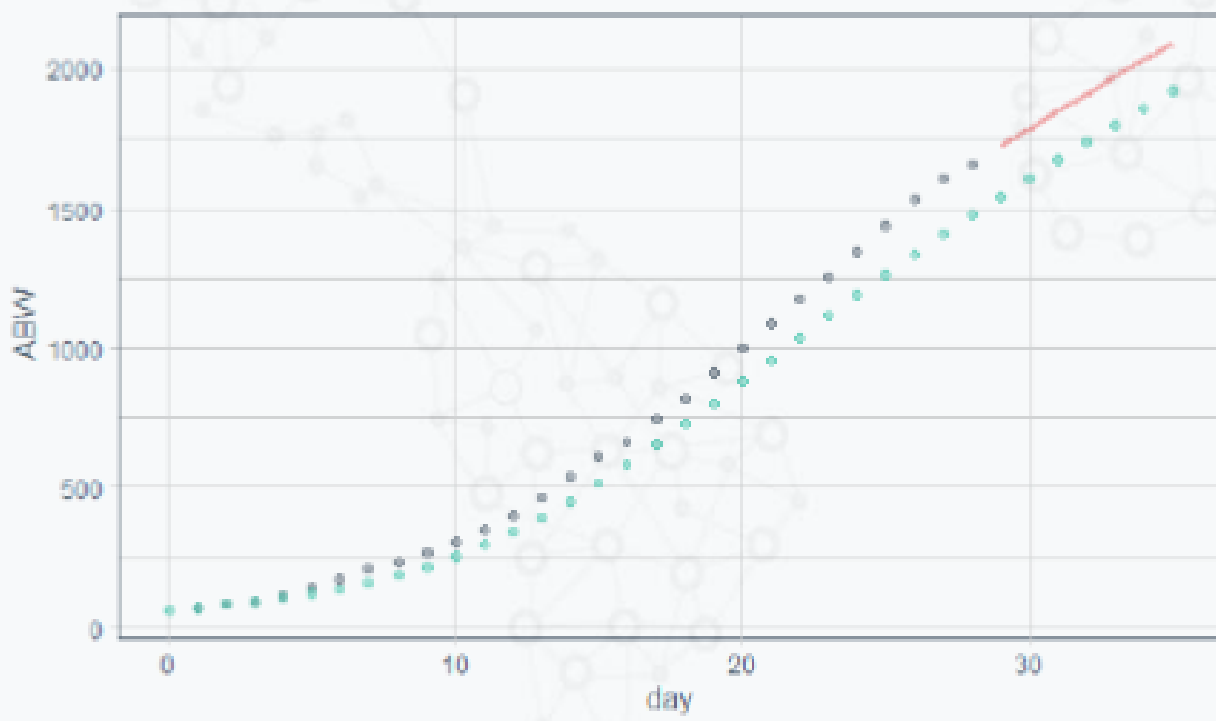
Per dag wordt de voorspelling opnieuw gemaakt, zodat gevolgen van ingrepen zichtbaar zijn

Voorspelling voor:

- Gewicht
- Voeropname
- Wateropname
- Uitval

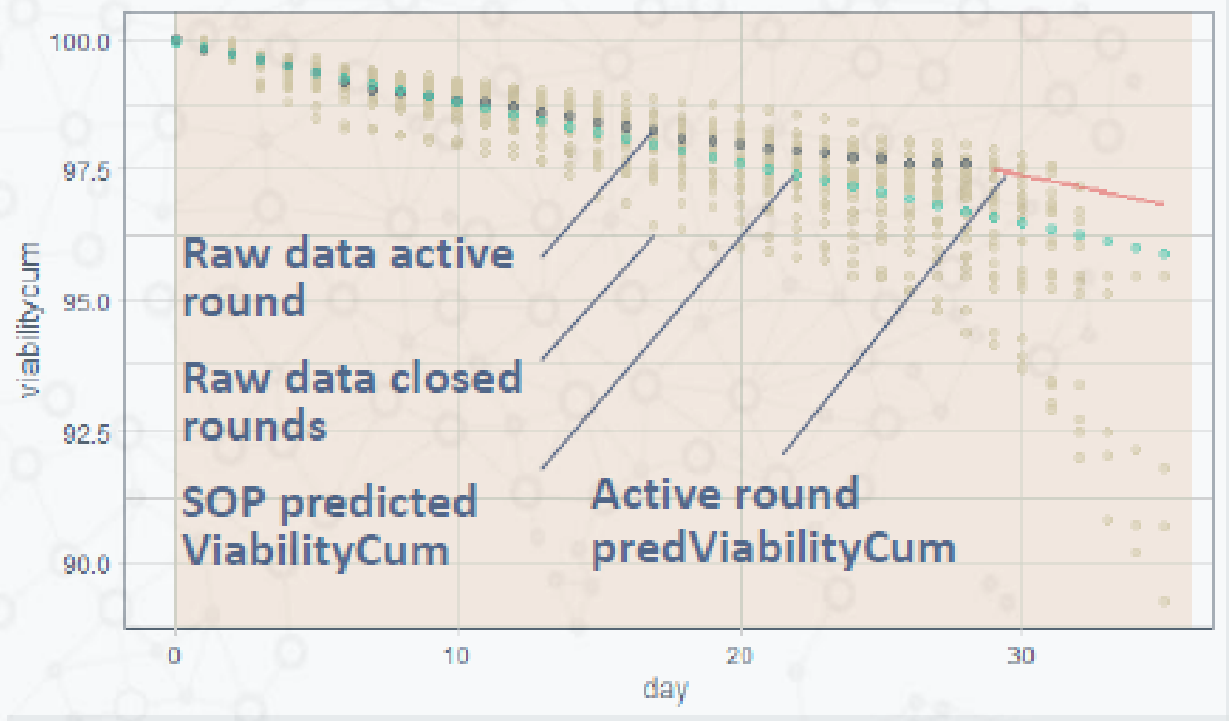
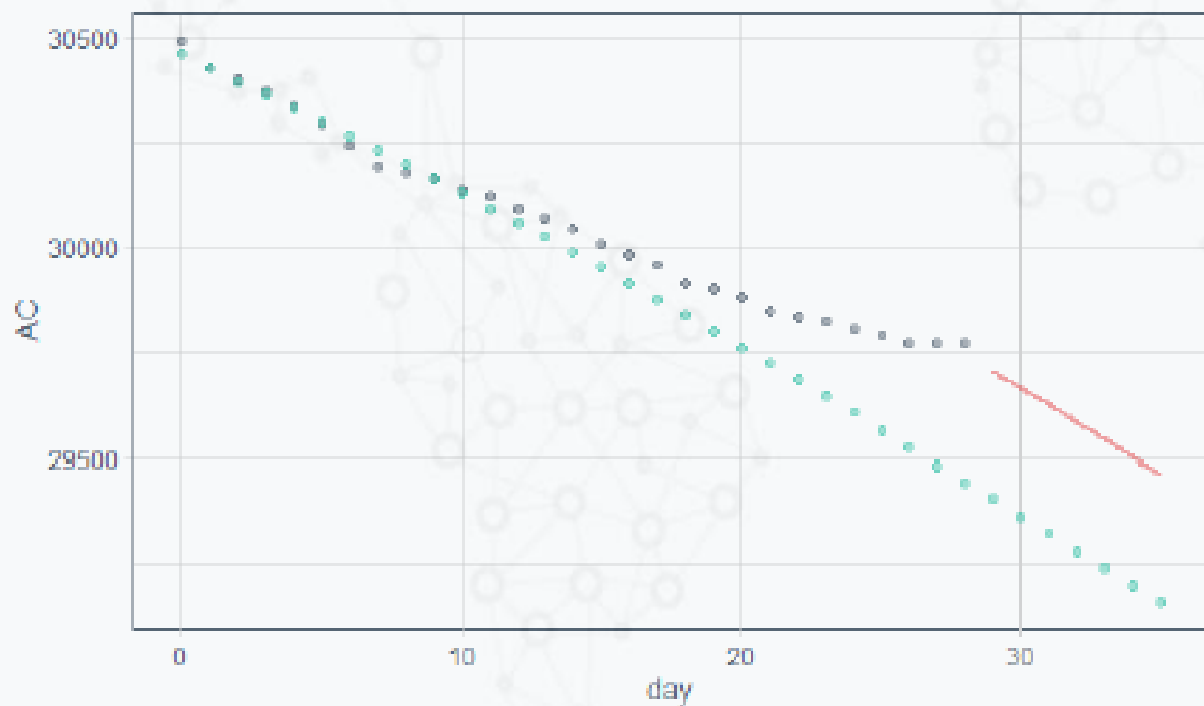


- $ABW \sim \text{day}$
- Predict Animal Body Weight (ABW) in active round per house

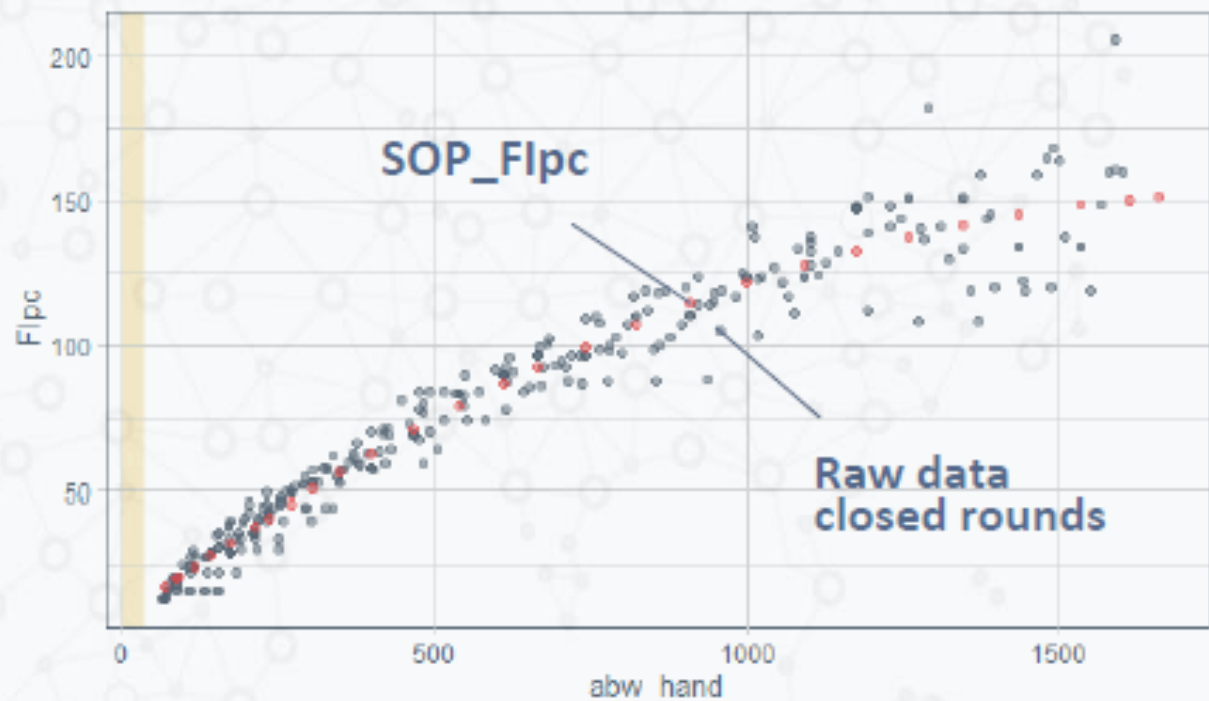
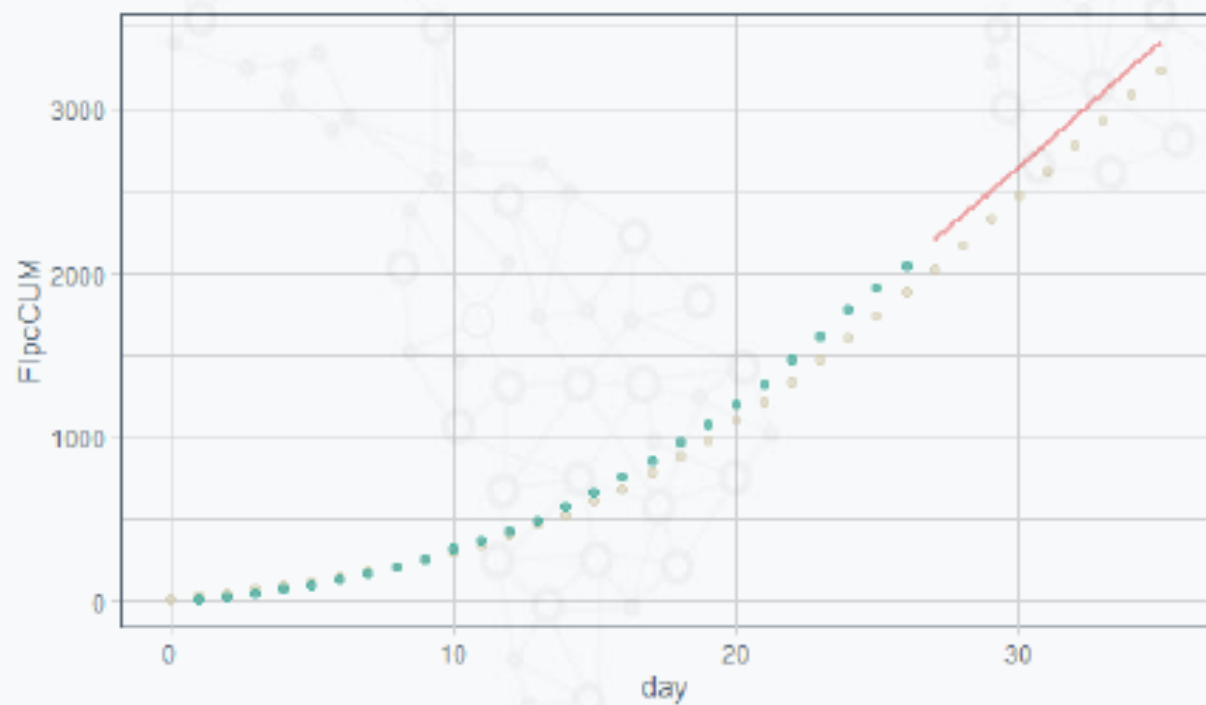


Raw data closed rounds

- $AC \sim \text{day}$
- Predict Animal Count (AC) in active round per house



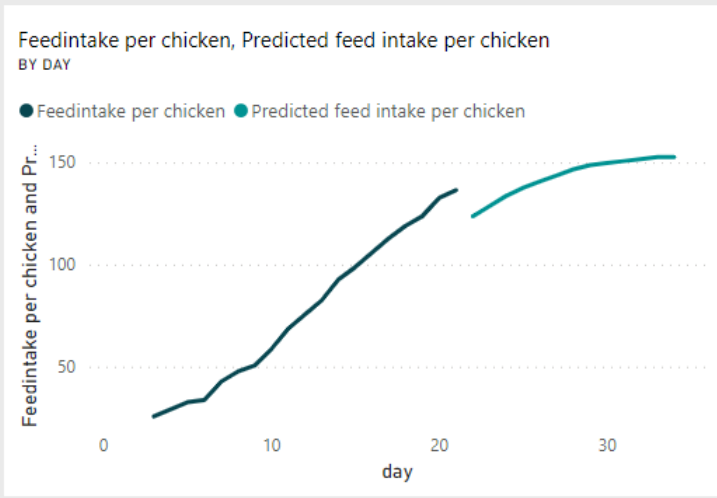
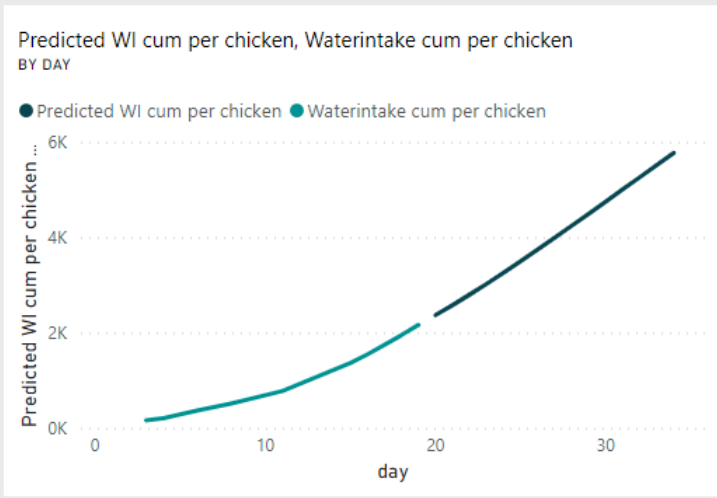
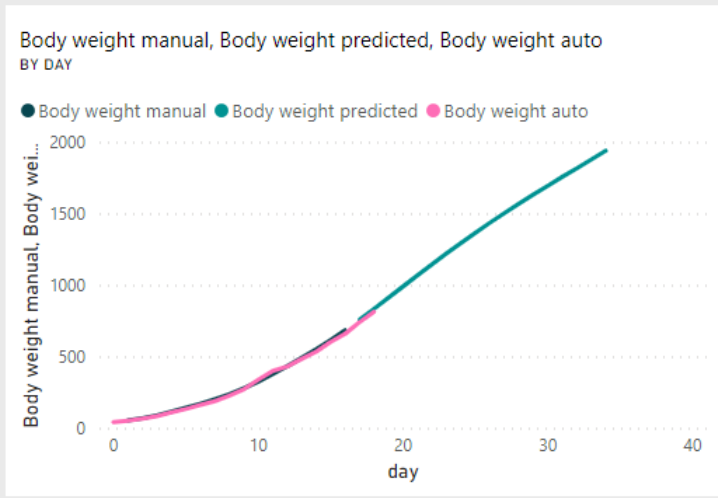
- $Flpc \sim ABW + ABW^2$
- Predict Cumulative Feed Intake per chick (FlpcCUM)  
in active round per house



- Home
- Favorites >
- Recent >
- Apps
- Shared with me
- Learn
- Workspaces >
- My workspace >

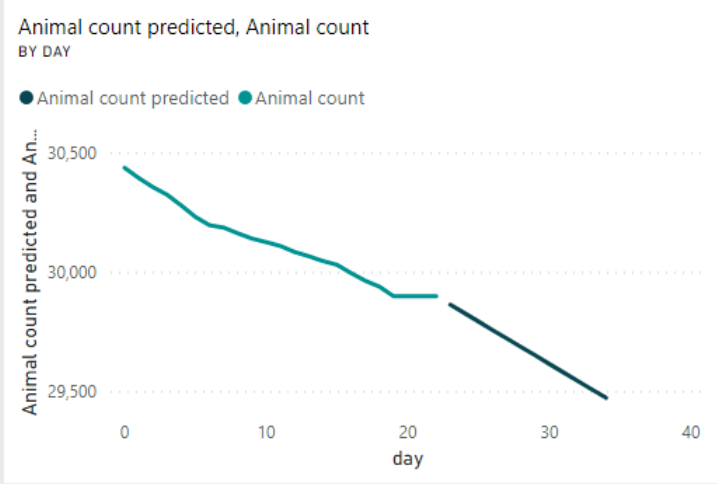
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Ask a question about your data



### Predicted kilograms per house

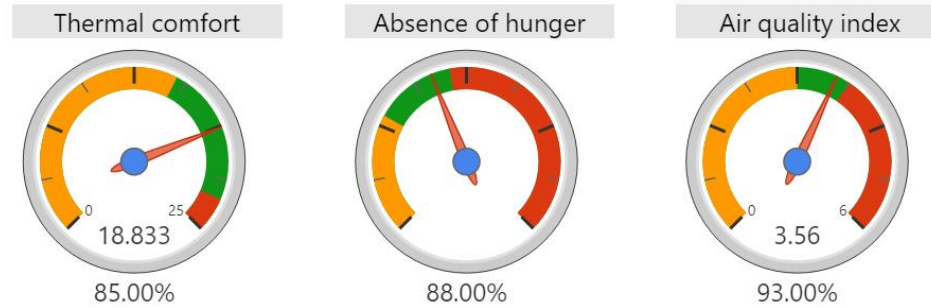
house	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
CMS0201								36785	38945	41010	43010	44946	46848	48657	50460	52201	53937	55668	57366
CMS0202								36585	38720	40819	42823	44793	46670	48511	50319	52063	53803	55538	57240
CMS0301					29804	32102	34365	36563	38726	40794	42827	44766	46671	48511	50288	52061	53799	55504	57234
CMS0302					29695	32002	34273	36479	38649	40754	42765	44741	46652	48500	50283	52062	53807	55548	57254
CMS0401				27666	29949	32196	34437	36614	38727	40804	42788	44709	46566	48388	50148	51874	53595	55313	56996
CMS0402				26235	28548	30856	33128	35394	37565	39701	41773	43749	45692	47569	49383	51163	52909	54650	56387
CMS0501	18743	20904	23120	25390	27684	29973	32256	34475	36688	38806	40860	42850	44776	46668	48467	50261	51992	53719	55412
CMS0502	16766	18814	20976	23223	25494	27789	30079	32334	34583	36767	38887	40972	42963	44890	46753	48552	50348	52079	53807
<b>Total</b>	<b>18954</b>	<b>21646</b>	<b>23882</b>	<b>26186</b>	<b>28871</b>	<b>31155</b>	<b>33422</b>	<b>35653</b>	<b>37825</b>	<b>39931</b>	<b>41966</b>	<b>43940</b>	<b>45854</b>	<b>47711</b>	<b>49512</b>	<b>51279</b>	<b>53023</b>	<b>54752</b>	<b>56461</b>





# Welfare Benchmark: Pigs/Poultry

- Performance
- Welfare
- Sustainability
  - P efficiency
  - N efficiency



Name	PODO Avg slaughter result	Bedding	Birds/m2	PODO 4wk	PODO 5wk	Black Hook 4wk	Black Hook 5wk	Enrichment
Smith	16	Chopped straw	12	12	14	12	12	Straw
Johnson	12	Straw long	12	10	11	11	12	Straw
Samualson	12	Chopped straw	14	9		10		Straw
McDowell	11	Chopped straw	13	2		2		
Bedford	8	Wood shavings	12	7	8	8	8	
McPherson	8	Maize	12	6	7	7	7	Straw
Sam	7	Straw long	12	7	0	6	7	Straw



KPI welfare	KPI technical	Absence hunger	Thermal comfort	Air quality	CO2 levels	Feed	Feed weight	+
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WELFARE PRINCIPLES	WELFARE CRITERIA	WELFARE MEASUREMENTS	AUTOMATED MEASURING
GOOD FEEDING	Freedom from hunger & thirst	Feed intake	Feed computer
		Water intake	Water meter
GOOD HOUSING	Freedom from discomfort	Total duration darkness	Light scheme or lux sensor
		Thermal comfort	Climate computer
		Humidity	Climate computer
		CO2	Climate computer
APPROPRIATE BEHAVIOUR	Ease of movement	Stock density	Calculation
		Activity index	Weigher
		Distribution index	Camera system
GOOD HEALTH	Absence of diseases	Mortality	Manually
		Podo score	Manually

## Bigdata en AI

- Voorwaarde : valide data in context
- Domein kennis is hierbij noodzakelijk
- Data bronnen: farm equipment, ketenpartijen en innovatieve nieuwe sensoriek
- Begin een AI project met een duidelijk doel en waarde
- Start klein en bouw daarna uit



**Big Dutchman.**



livestock management

Dank u wel

