Dall'allevamento al Cloud: come i big data rivoluzionano l'avicoltura

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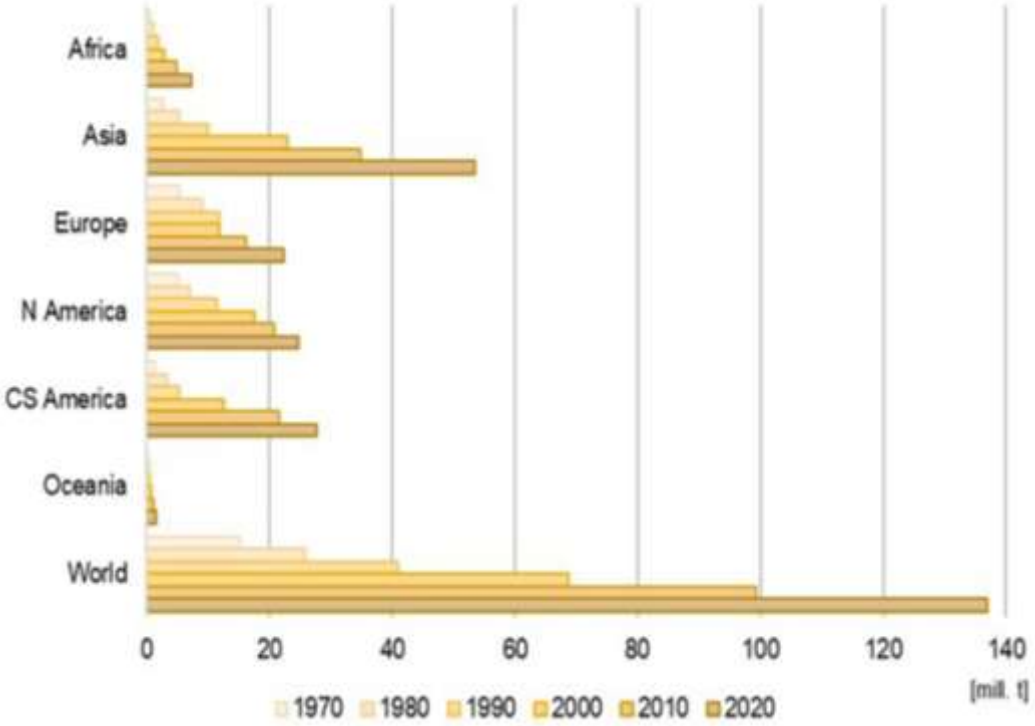
64° Convegno Annuale SIPA, Bologna (BO), 6 Giugno 2025



Food and Agriculture Organization of the United Nations

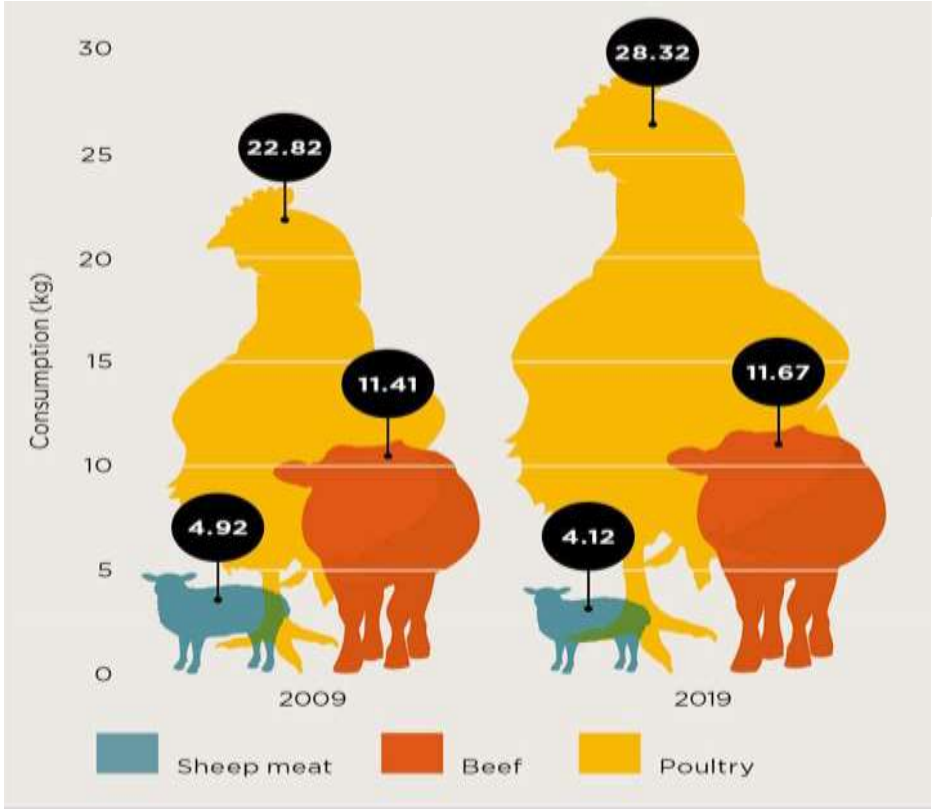
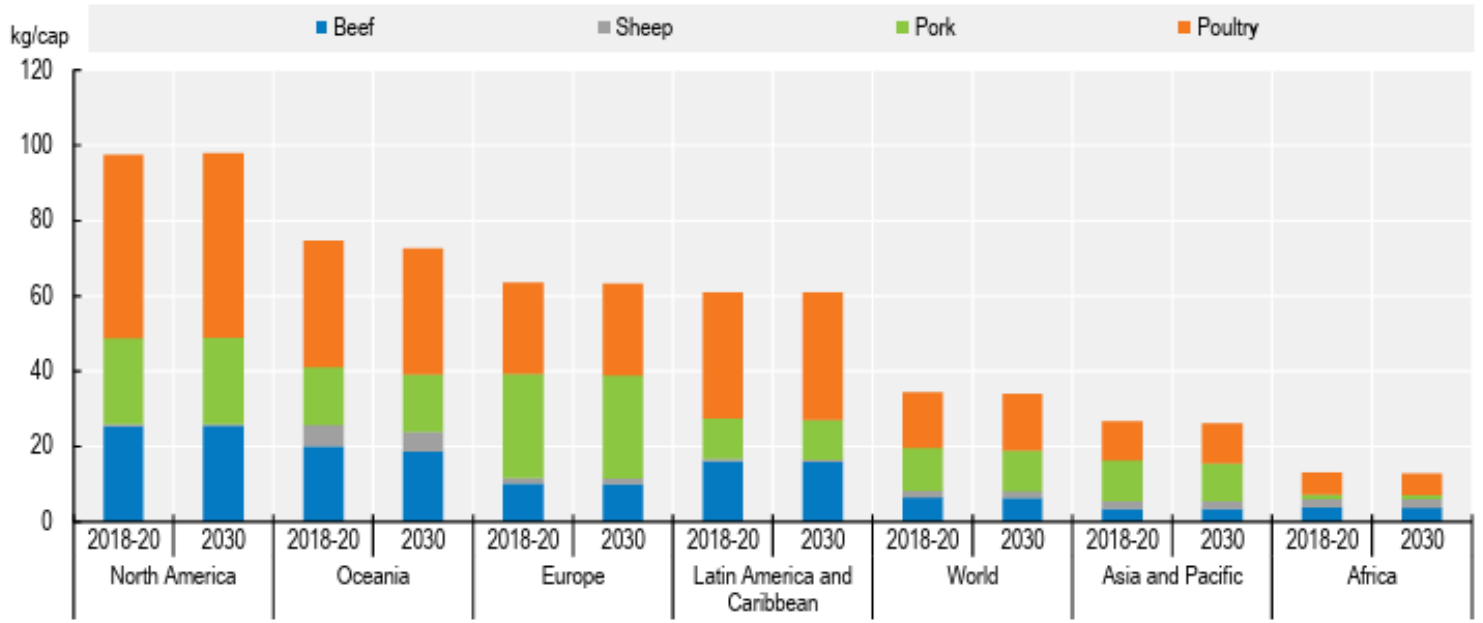
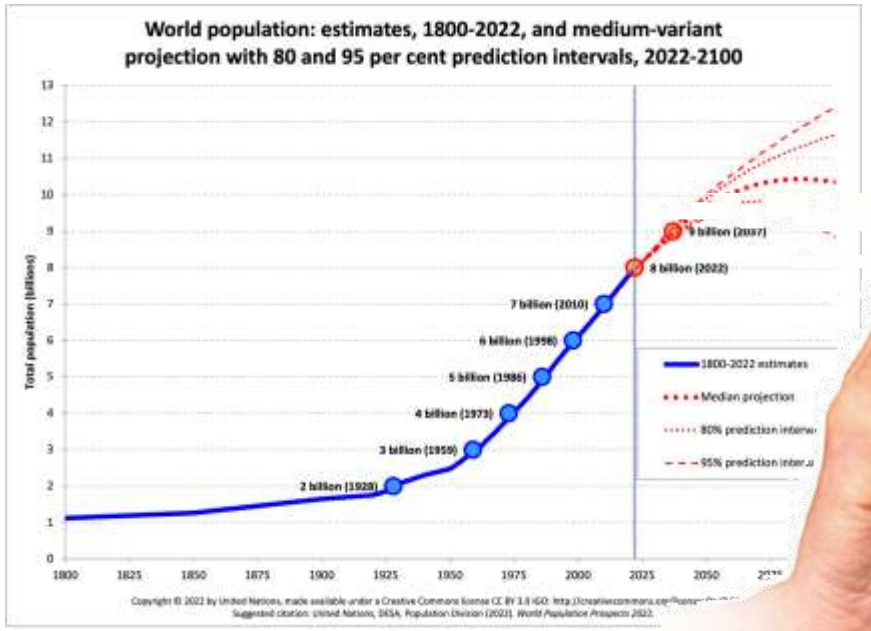


Figure 6.8. Meat consumption per capita: Continued rise of poultry and fall of beef



Note: Per capita consumption is expressed in retail weight.
Source: OECD/FAO (2021), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), http://dx.doi.org/10.1787/agr-outl-data-en.



EARTH OVERSHOOT DAY

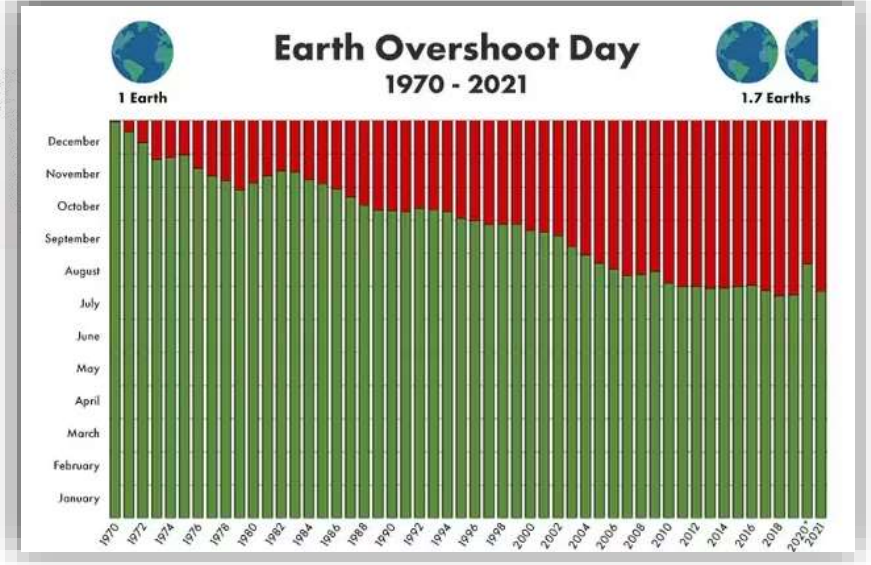
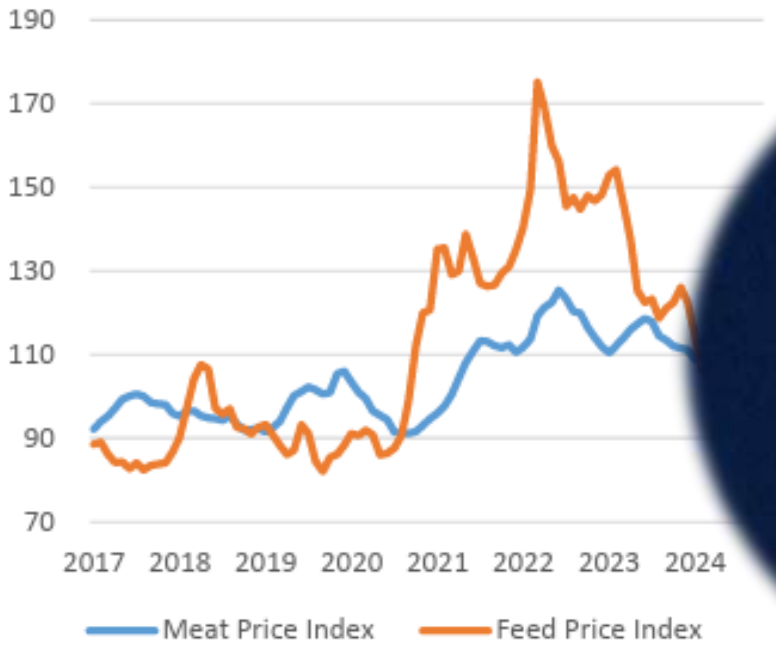
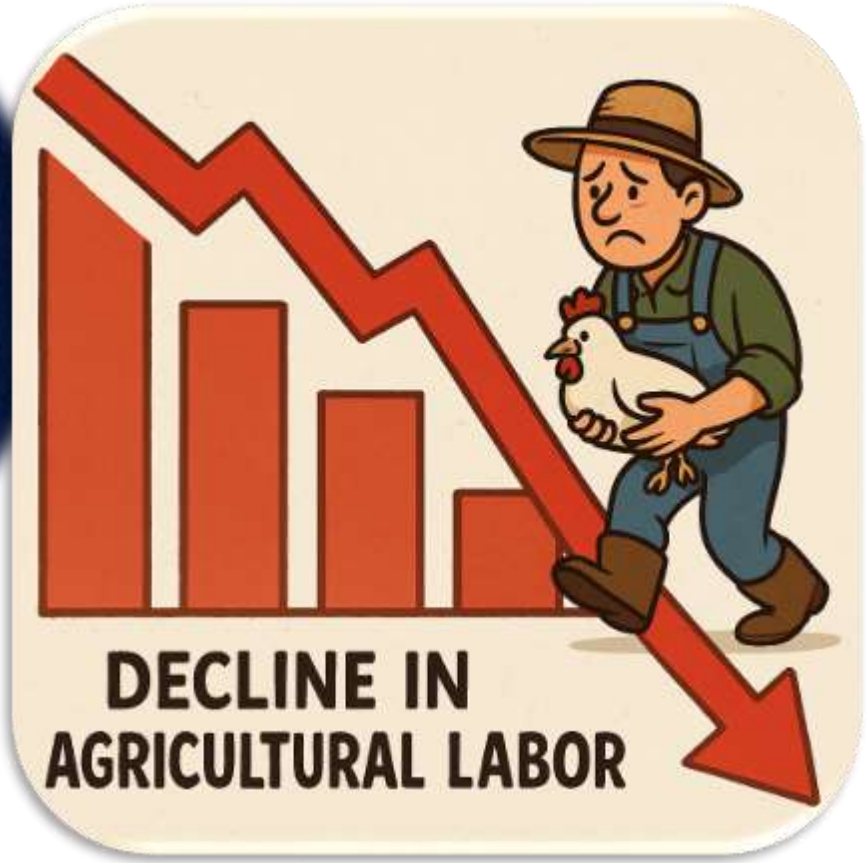
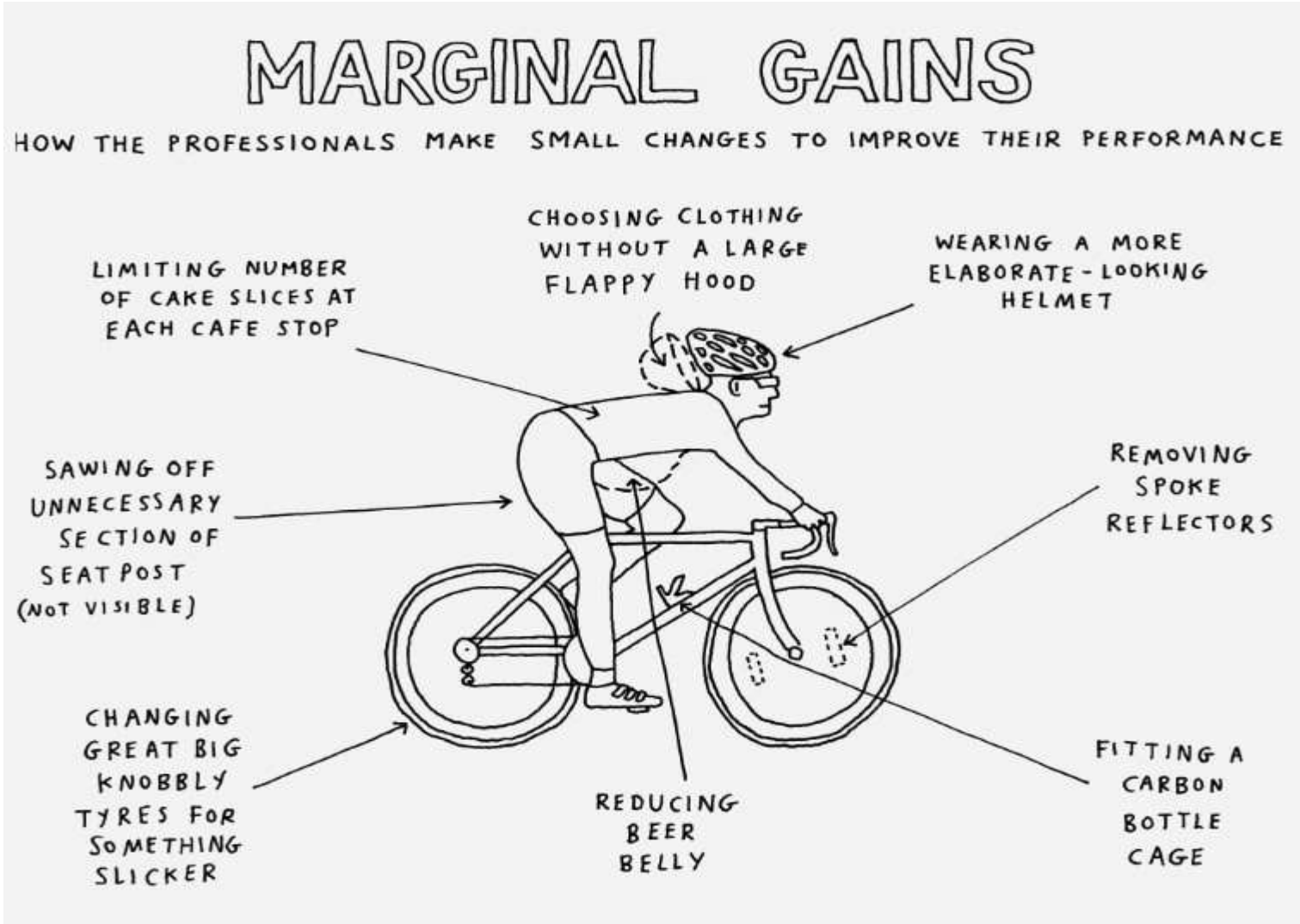


Figure 2. FAO Meat and Feed Price Indices (2014-2016=100)

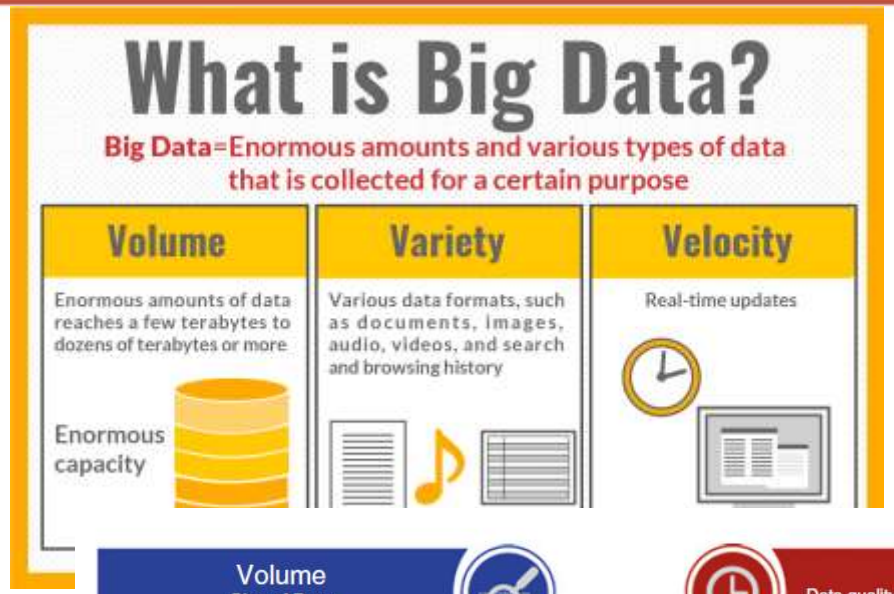





Costs
Quality
Speed
Results

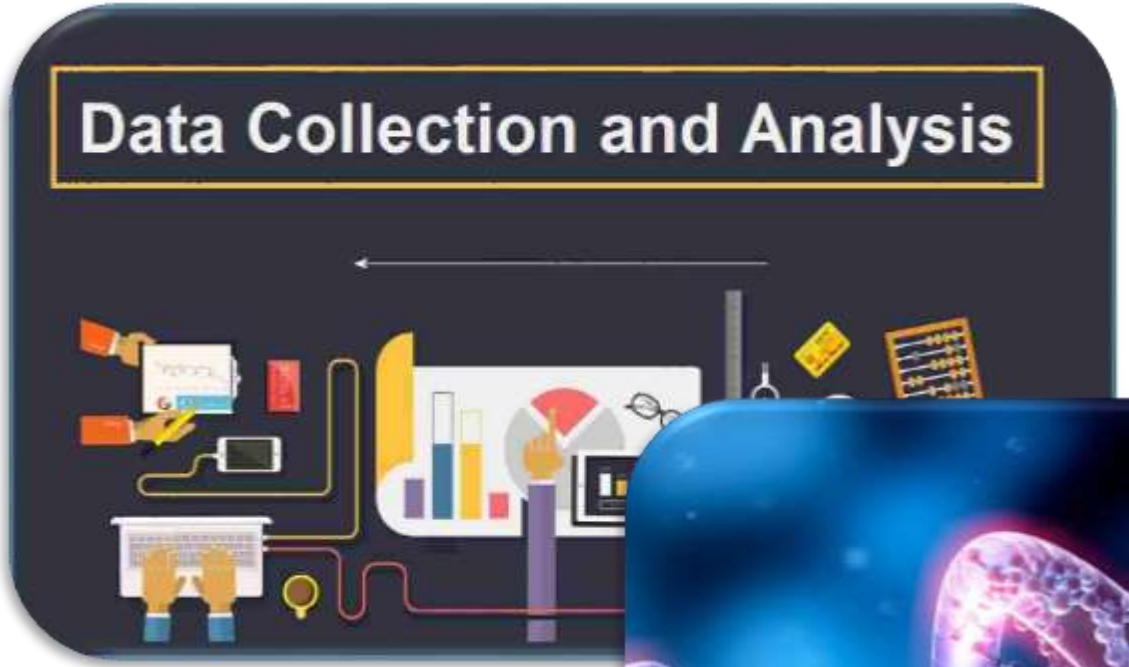

MARGINAL GAINS
HOW THE PROFESSIONALS MAKE SMALL CHANGES TO IMPROVE THEIR PERFORMANCE
LIMITING NUMBER OF CAKE SLICES AT EACH CAFE STOP
CHOOSING CLOTHING WITHOUT A LARGE FLAPPY HOOD
WEARING A MORE ELABORATE-LOOKING HELMET
SAWING OFF UNNECESSARY SECTION OF SEAT POST (NOT VISIBLE)
REMOVING SPOKE REFLECTORS
CHANGING GREAT BIG KNOBBLY TYRES FOR SOMETHING SLICKER
REDUCING BEER BELLY
FITTING A CARBON BOTTLE CAGE

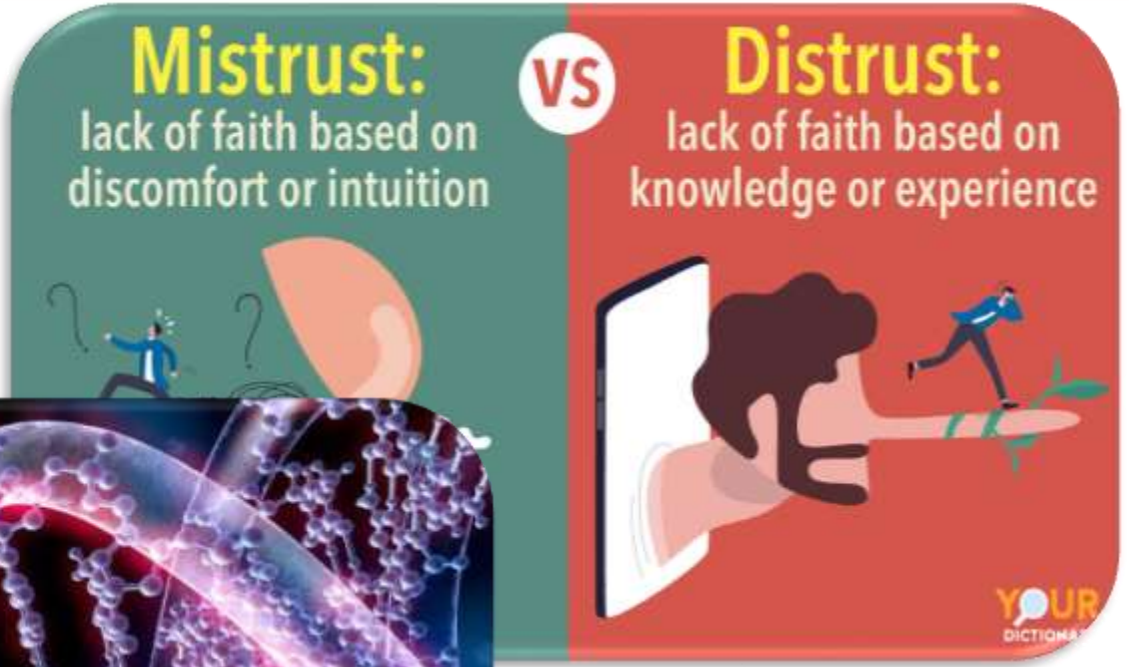

COMPANIES THAT COLLECT LARGE AMOUNTS OF DATA
Google
Meta
amazon
Microsoft
X



Characteristics	Meaning	Characteristics	Meaning
Volume	Size of data generated in healthcare	Venue	No customer workstation in cloud (logically)
Velocity	The speed at which data is generated	Version control	You are using it right?
Variability	The change in data semantics, data structure, data format and data rate. Evolving behaviour in data source	Vexed	Potential of data science to handle complicated problems
Variety	Diverse source of data from which different sources data is produced	Vibrant	Provision of insight by data science
Veracity	The quality of data that is produced, data accuracy	Viral	How fast data spreads
Value	Useful data	Virtuosity	Craze to get more knowledge about Big Data
Validity	Data quality, governance, data management on massive	Visualization	The way customer interacts with models
Varnish	Interaction of end-users with our work matters, and polish counts	Vogue	Artificial intelligence will become?
Vault	Importance of data security	Voodoo	Deliver results with real-world impact
Veil	Examine latent variables from behind the curtain	Vulpine	Data leads to a new technology
Verdict	People affected by model's decision	Vagueness	Confusion about meaning of Big Data and tools that are used
Versed	Knowledge about: mathematics, statistics, programming, etc.	Valour	Tackle the big problem in face of Big Data
Vet	Vetting the assumptions with evidence	Vane	Unclear direction of decision-making
Viability	Difficult to build robust models	Vanilla	Simple methods if tackled with care, can provide value
Victual	Big Data fuel of data science	Vantage	Privileged view of complex systems
Visibility	Data science provides visibility into complex data problems	Varmint	As data gets bigger, so do software bugs
Vivify	Ability of data science to cope with every real-life aspect	Vastness	Bigness of Big Data
Voice	Ability to speak with knowledge	Vaticination	Ability to forecast
Volatility	Data should never be missing	Veer	Change direction according to customer need
Voyage	Increasing knowledge	Venue	Distributed heterogeneous data from multiple platforms
Varifocal	It is about trees and forest	Vocabulary	Data models, semantics that describe the data

The 42 V's of Big Data and Data Science


Data Collection and Analysis

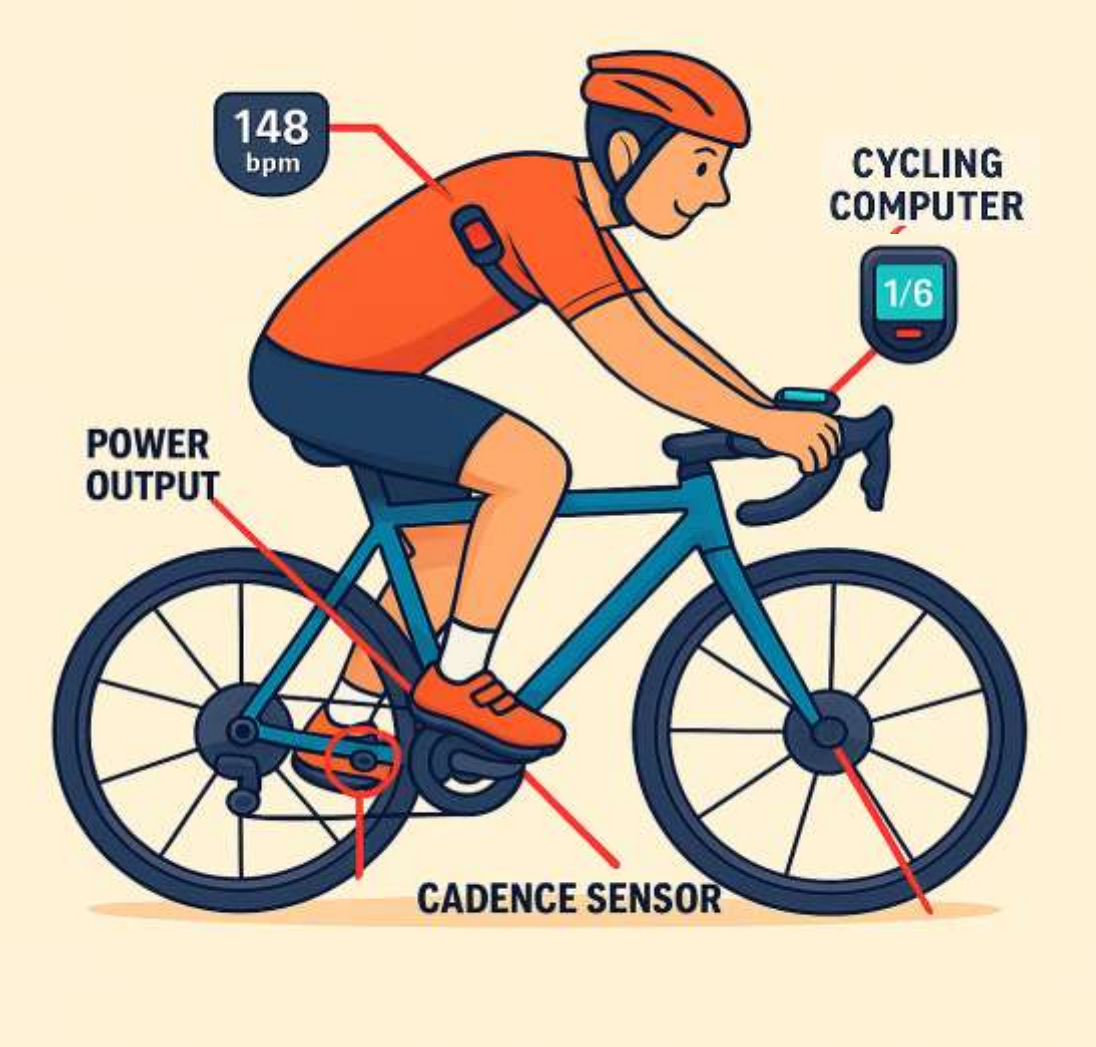

Mistrust:
lack of faith based on discomfort or intuition
VS
Distrust:
lack of faith based on knowledge or experience

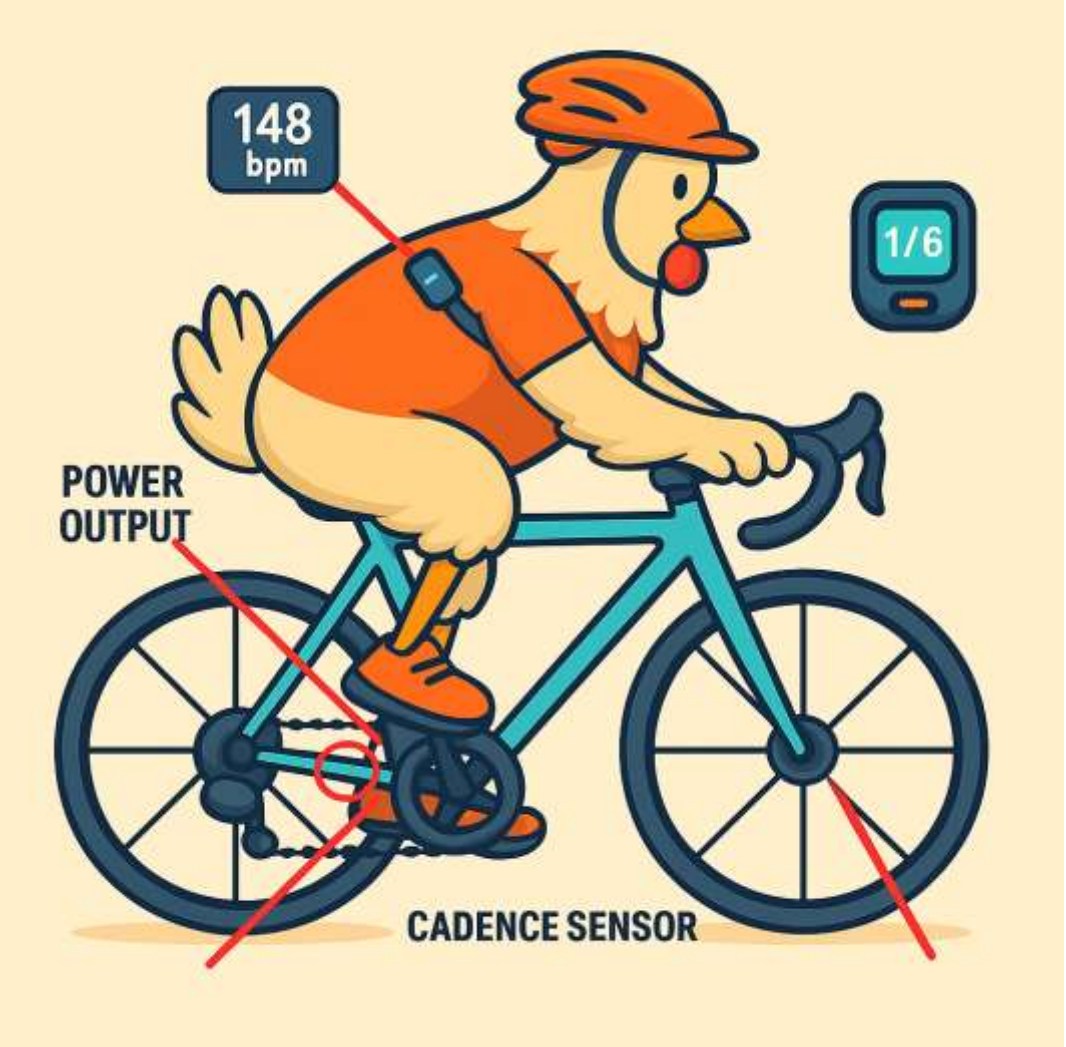
PRECISION LIVESTOCK FARMING

Precision livestock farming è la gestione della produzione zootecnica che trae vantaggio dall'automatizzazione di:

- **Acquisizione dei dati**
- **Accesso ai dati**
- **Elaborazione dei dati**


castelli
INEOS
PINARELLO


148
bpm
CYCLING
COMPUTER
1/6
POWER
OUTPUT
CADENCE SENSOR


148
bpm
1/6
POWER
OUTPUT
CADENCE SENSOR

MAPS

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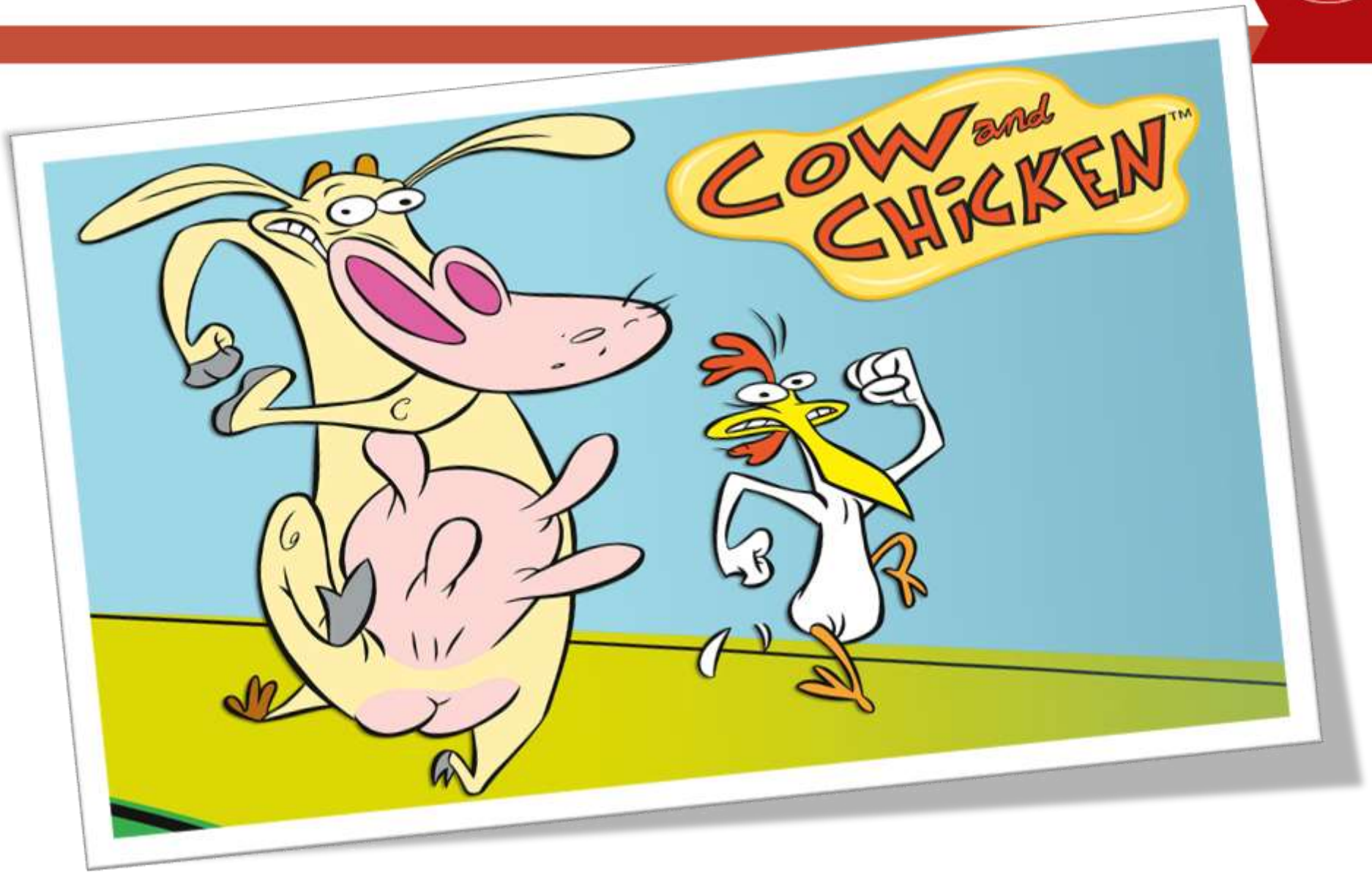


AURUM
POLITECNICO
MILANO 1863


Temp
29.7
°C
Hum
42.8
%RH

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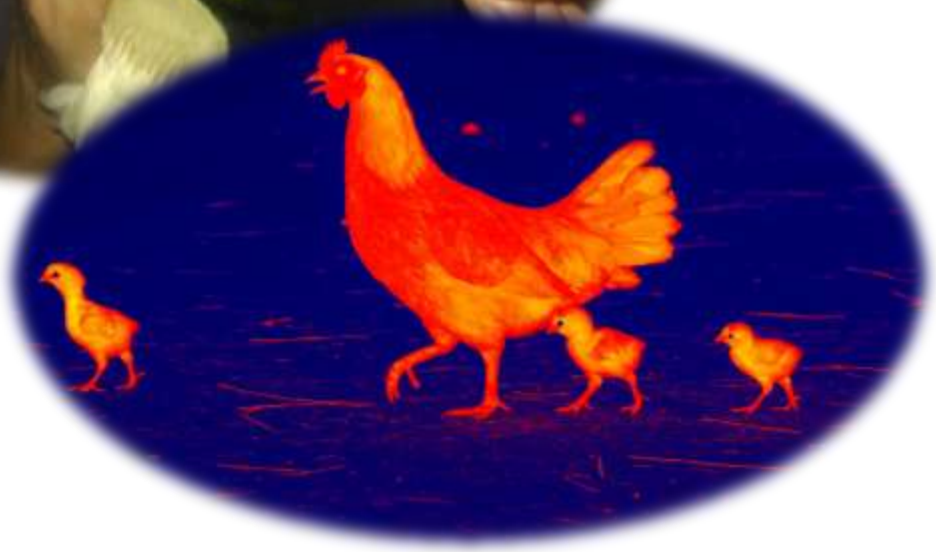

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Available online at www.sciencedirect.com
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journal homepage: www.elsevier.com/locate/issn/15375110

Special Issue: Environmental Stressors

Research Paper

Automatic broiler temperature measuring by thermal camera

Victor Bloch [a], Natan Barchilon [a,b], Ilan Halachmi [a], Shelly Druyan [a,b,*]

[a] Precision Livestock Farming (PLF) Laboratory, Institute of Agricultural Engineering, Agricultural Research Organization (ARO) – The Volcani Centre, Rishon Lezion, 7528809, Israel
[b] Institute of Animal Science, Agricultural Research Organization (ARO), The Volcani Center, 68 HaMakkabim Road, Rishon Le Ziyon P. O. Box 15159, Israel

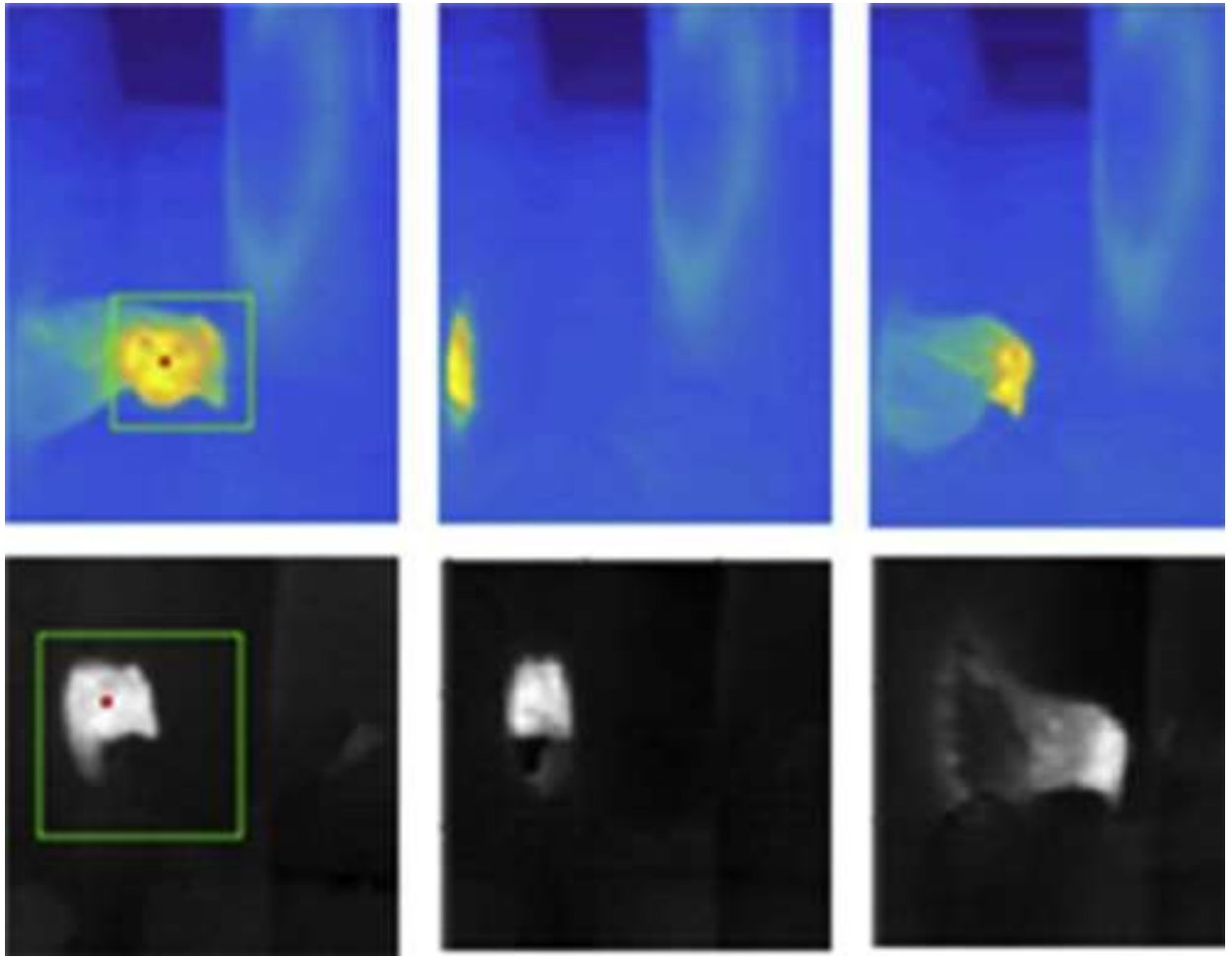


Fig. 2 – The temperature loggers intended to measure reference body temperature in the abdominal cavity. The loggers (a) were covered by protecting material. RFID tags used for timing the logger temperature (b) were adjusted in the upper side of neck.

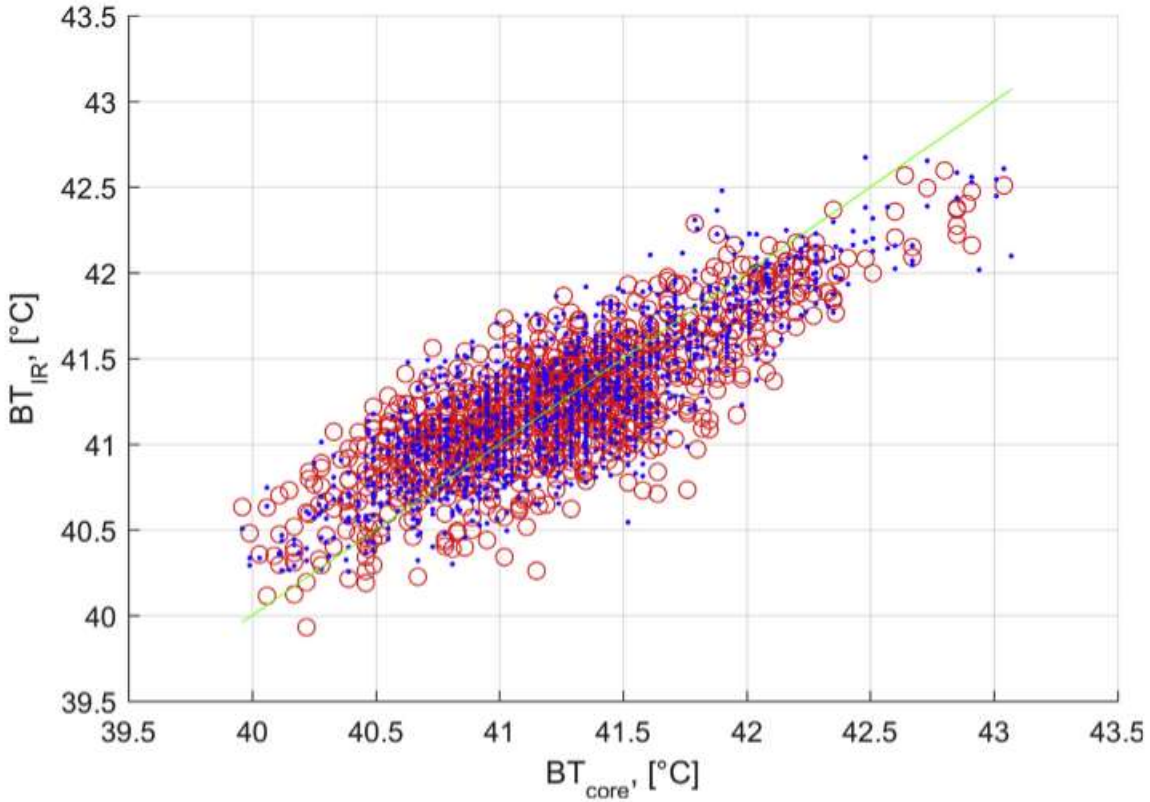
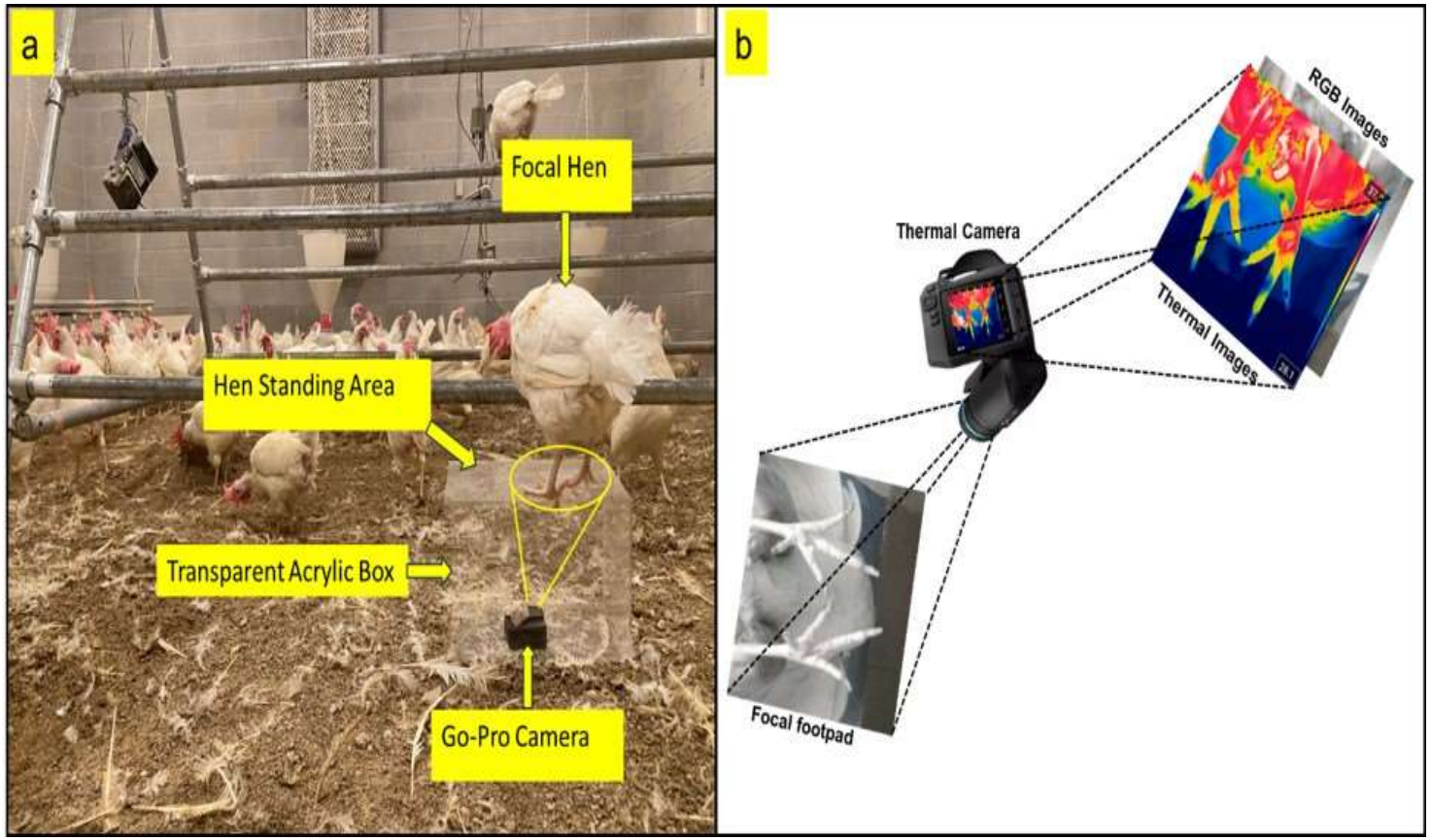
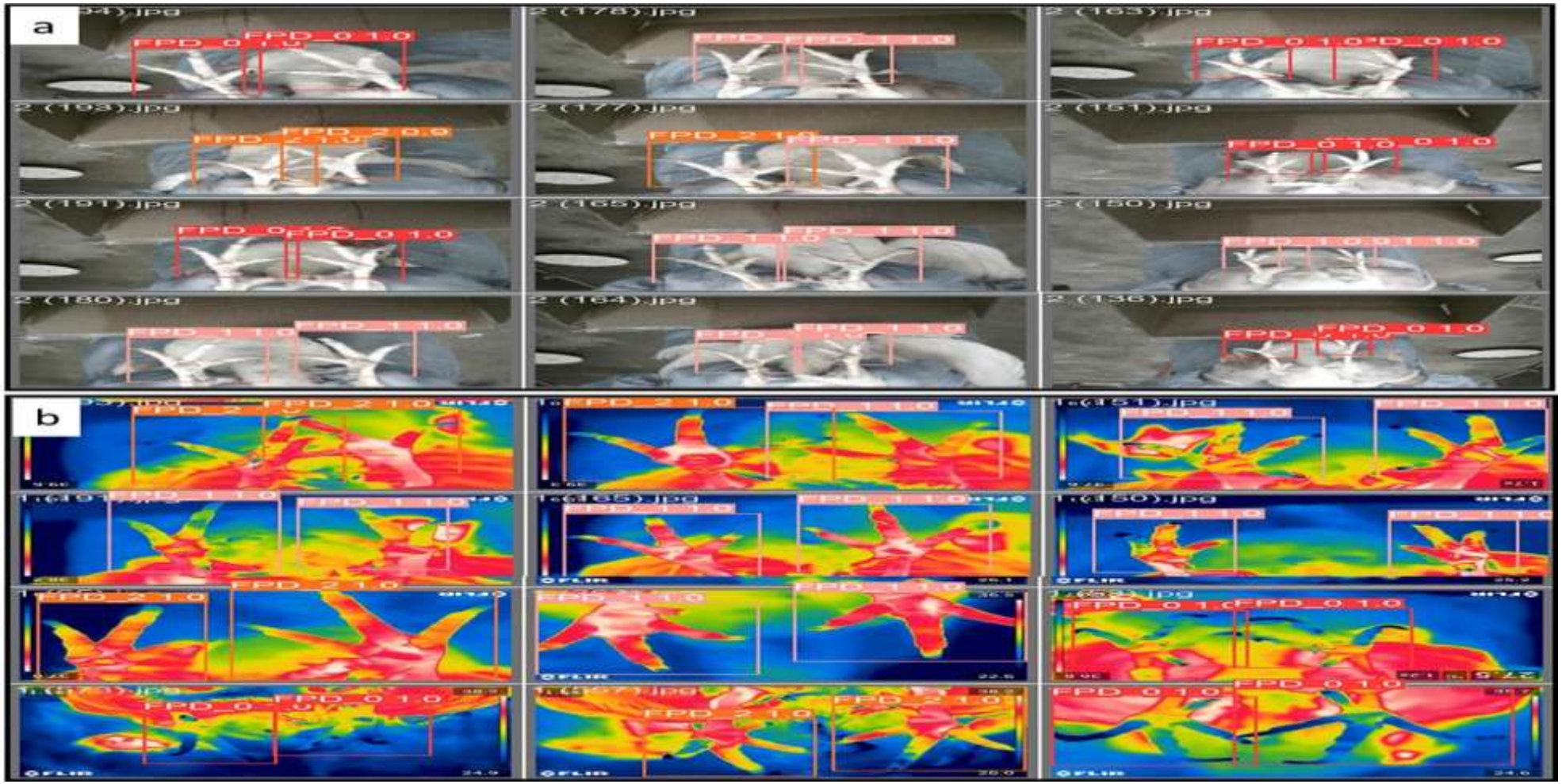


Fig. 4 – Body temperature measured by implanted temperature loggers in the broiler abdominal cavity (BT_{core}) is compared with infrared thermography temperature (BT_{IR}) monitored by FlirOne (dots) and Lepton (circles) cameras.


INFLAMACCIÓN
CALOR
RUBOR
TUMEFACCIÓN
DOLOR
PÉRDIDA DE FUNCIÓN


a
Focal Hen
Hen Standing Area
Transparent Acrylic Box
Go-Pro Camera
b
RGB Images
Thermal Camera
Thermal Images
Focal footpad


a
b

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frontiers in Veterinary Science

ORIGINAL RESEARCH
published: 25 May 2021
doi: 10.3389/fvets.2021.616756

Thermal Image Scanning for the Early Detection of Fever Induced by Highly Pathogenic Avian Influenza Virus Infection in Chickens and Ducks and Its Application in Farms

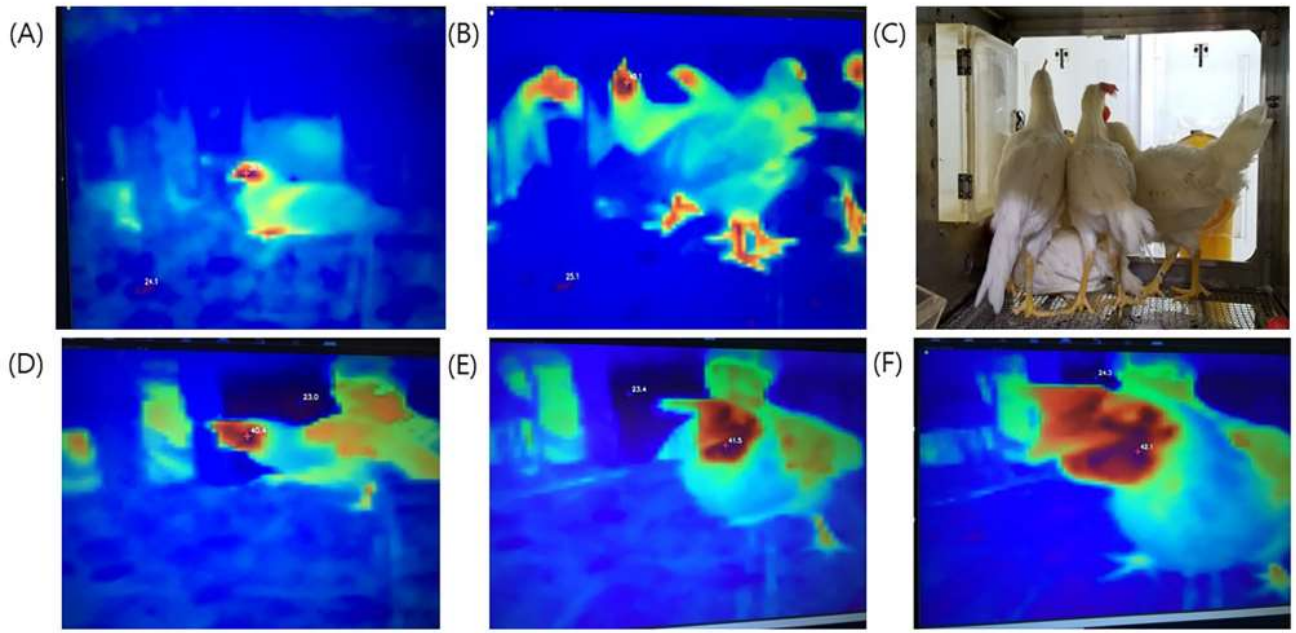
OPEN ACCESS

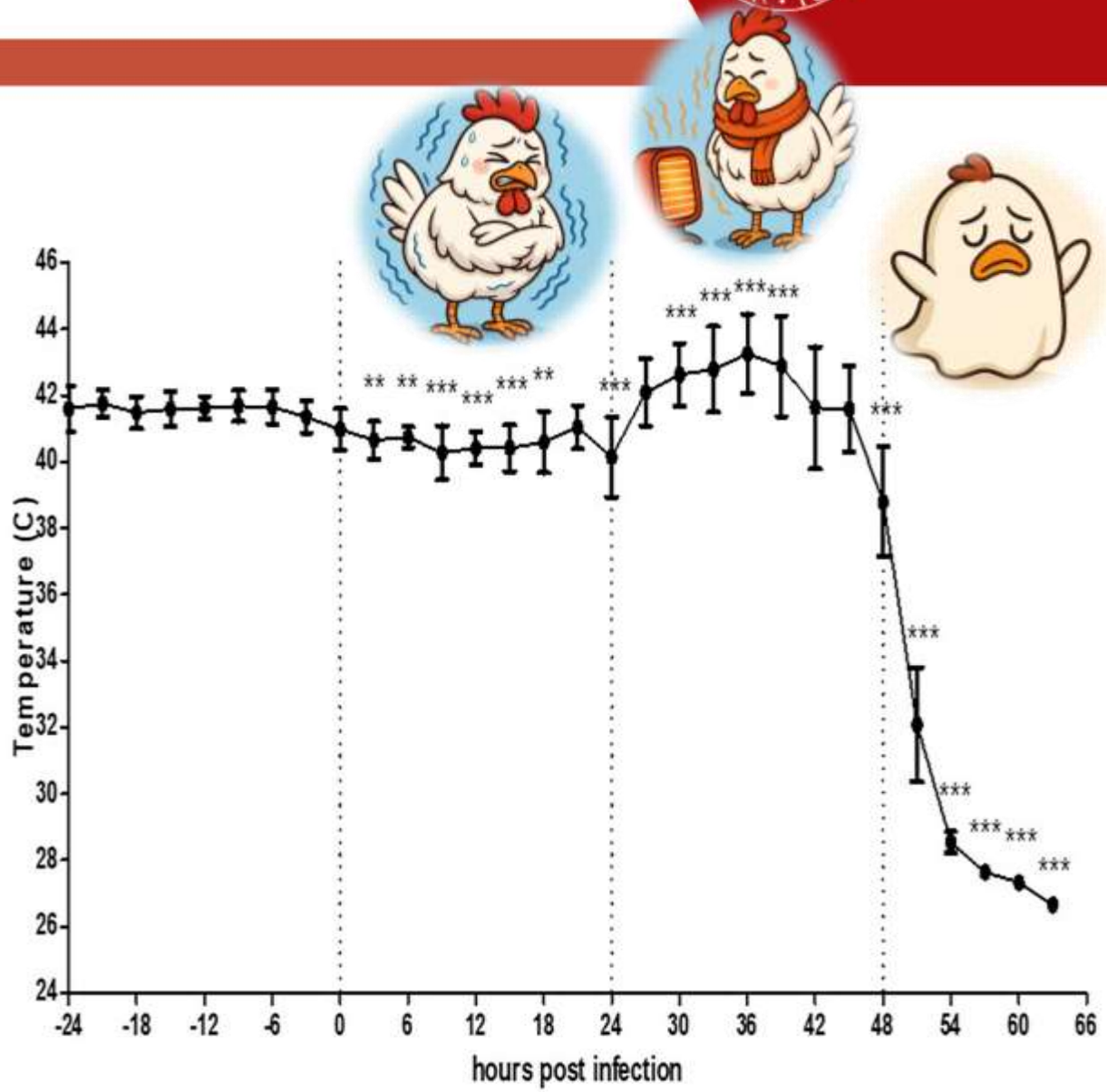
Edited by:
Anuwat Wiratsudakul,
Mahidol University, Thailand

Reviewed by:
Daniel Marc,
Le nouvel Institut national de

Jin-Yong Noh[1], Kyu-Jik Kim[1], Sun-Hak Lee[2], Jun-Beom Kim[1], Deok-Hwan Kim[2], Sungsu Youk[2]†, Chang-Seon Song[1,2] and Sang-Soep Nahm[3]

[1] Konkuk Cbt bio Animal Vaccine KCAV Co. Ltd, Seoul, South Korea, [2] Department of Avian Disease, College of Veterinary Medicine, Konkuk University, Seoul, South Korea, [3] Department of Anatomy, College of Veterinary Medicine, Konkuk University, Seoul, South Korea





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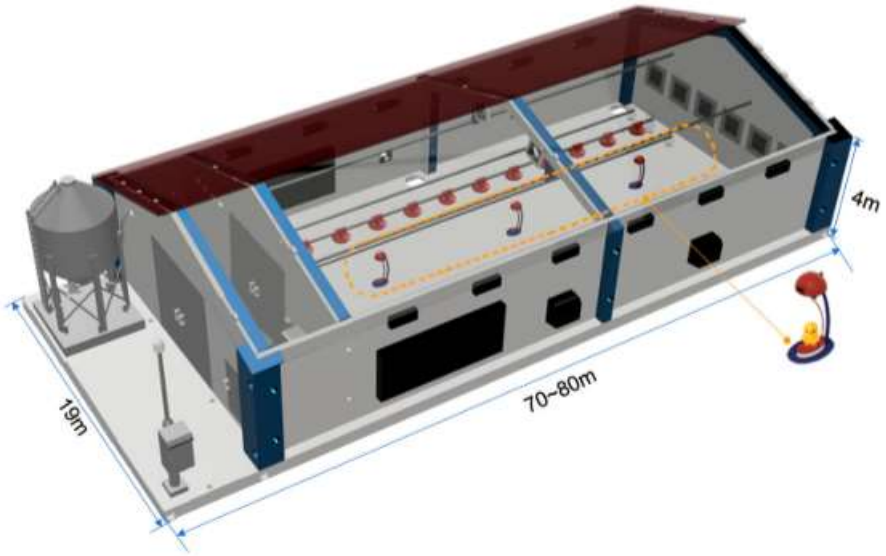
agriculture

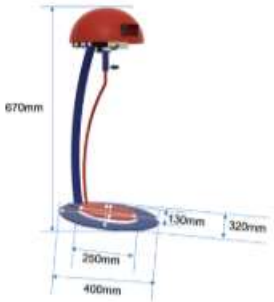
MDPI

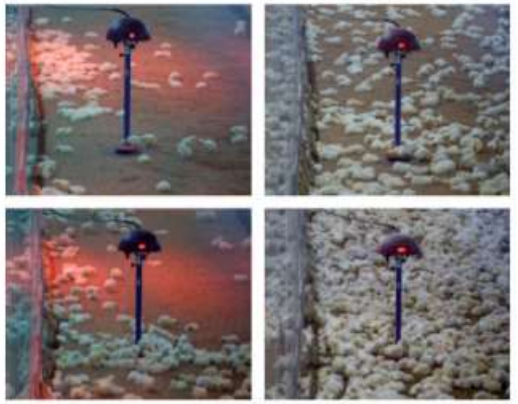
Article

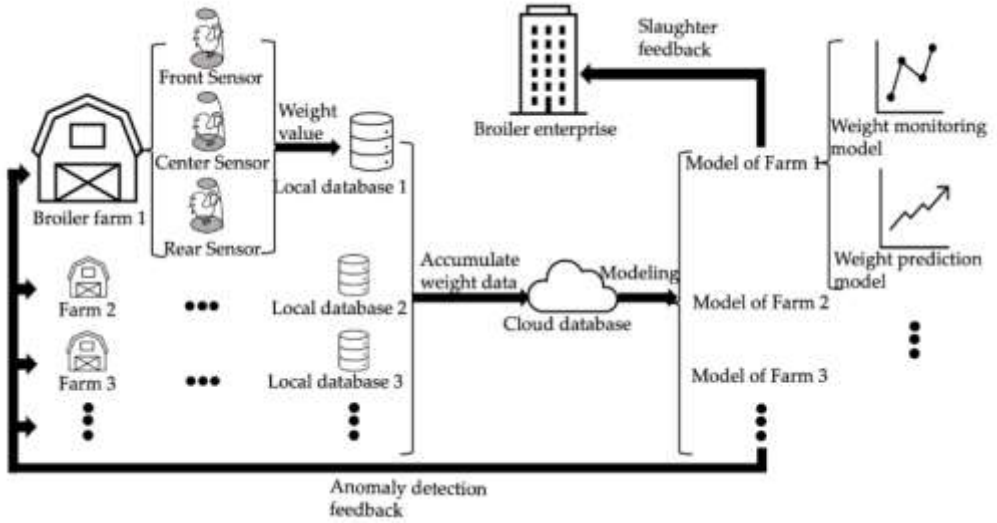
Application of Machine Learning Algorithms for On-Farm Monitoring and Prediction of Broilers' Live Weight: A Quantitative Study Based on Body Weight Data

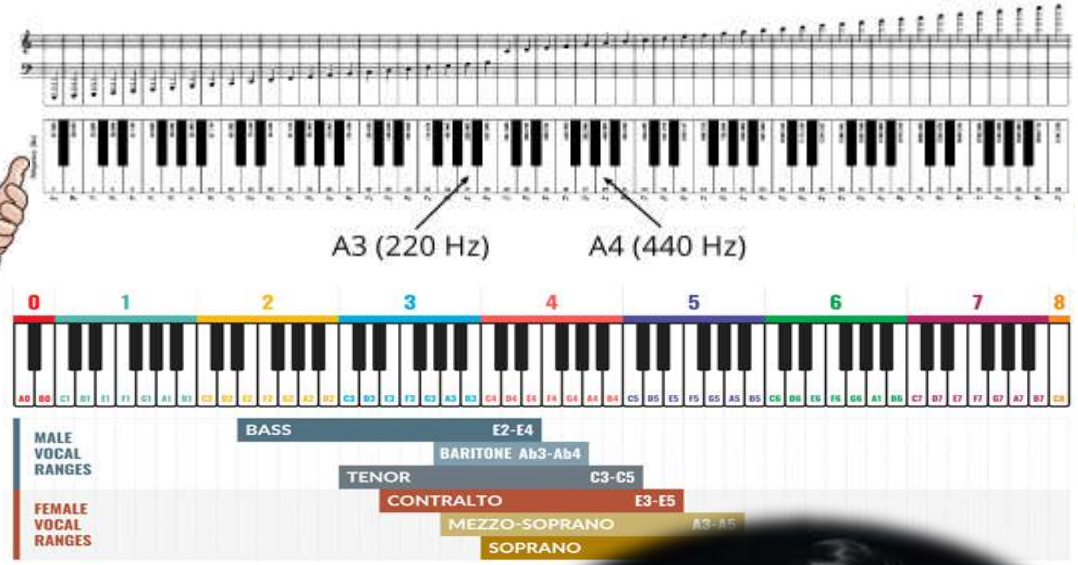
Peng Lyu [1,2], Jeongik Min [1,2] and Juwhan Song [1,2,*]










A3 (220 Hz)
A4 (440 Hz)
0
1
2
3
4
5
6
7
8
MALE VOCAL RANGES
BASS E2-E4
BARITONE Ab3-Ab4
TENOR C3-C5
FEMALE VOCAL RANGES
CONTRALTO E3-E5
MEZZO-SOPRANO
SOPRANO
WWW.30DAYSINGER.COM

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Computers and Electronics in Agriculture 119 (2015) 178–183

Contents lists available at ScienceDirect

Computers and Electronics in Agriculture

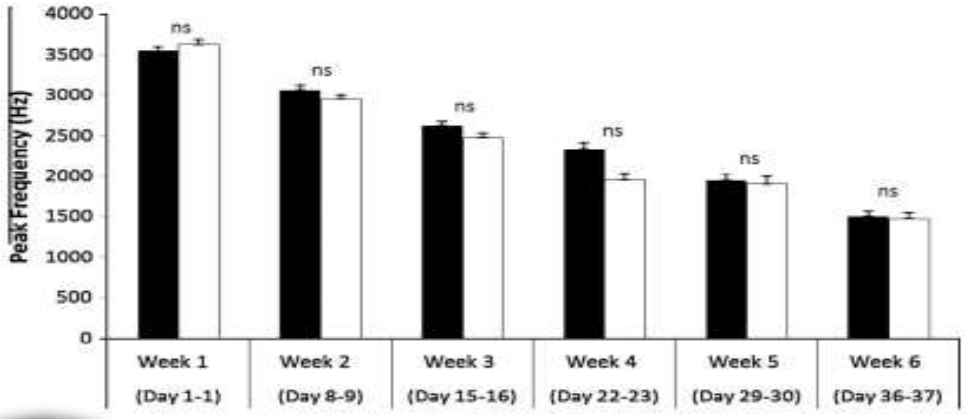
journal homepage: www.elsevier.com/locate/compag

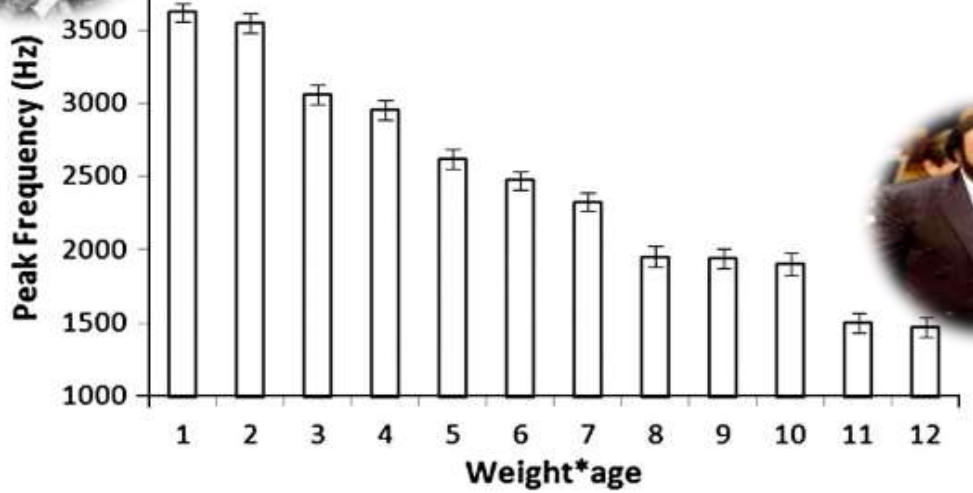
Original papers

An innovative approach to predict the growth in intensive poultry farming

Ilaria Fontana [a], Emanuela Tullo [a,*], Andy Butterworth [b], Marcella Guarino [a]

[a] Department of Health, Animal Science and Food Safety, Università degli Studi di Milano, Milan 20133, Italy
[b] Department of Clinical Veterinary Science, University of Bristol, Langford, BS40 5DU North Somerset, UK






GCN ITALIA
RACING
STRANEZZE ALLA RADIO
CHIEDIAMO AI PRO

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Computers and Electronics in Agriculture 114 (2015) 1–6

Contents lists available at ScienceDirect

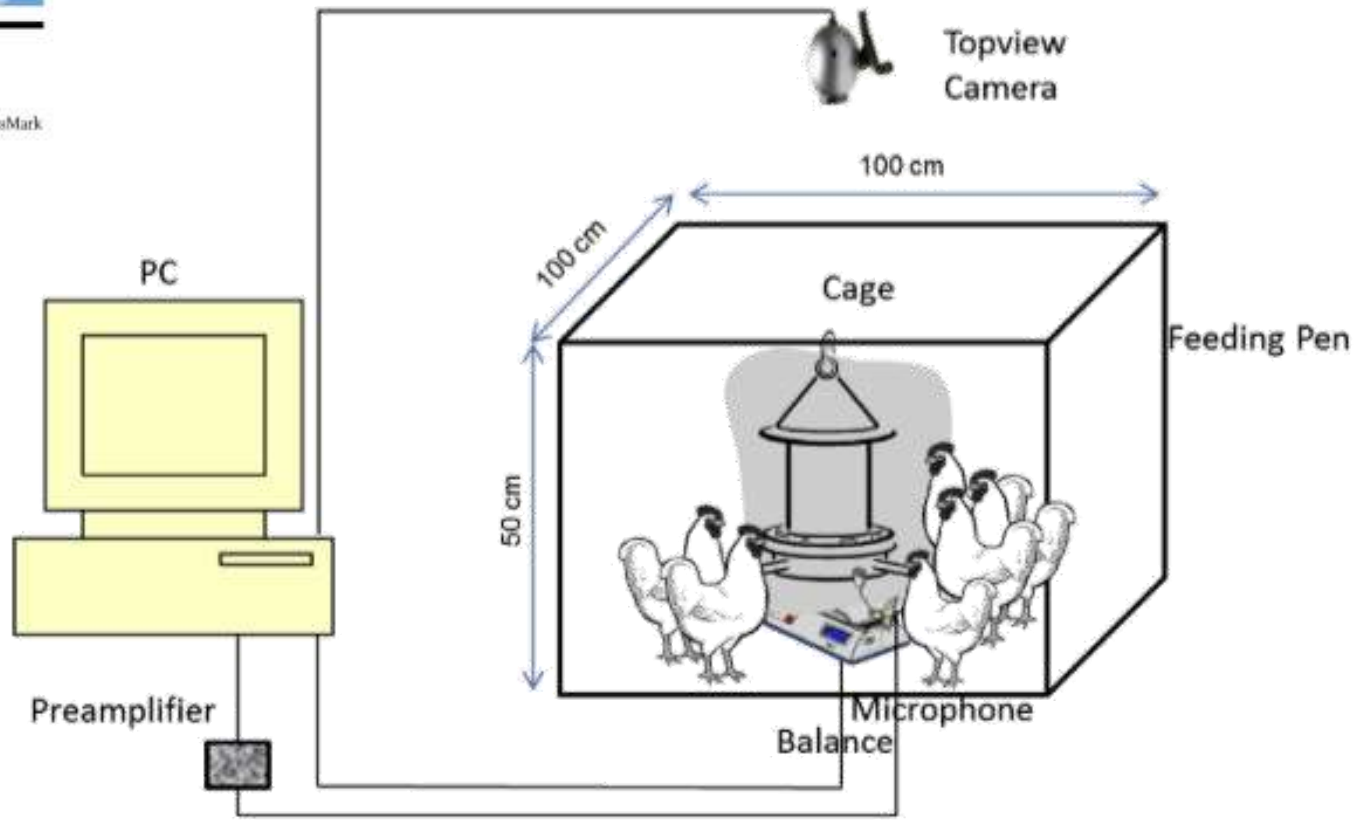
Computers and Electronics in Agriculture

journal homepage: www.elsevier.com/locate/compag

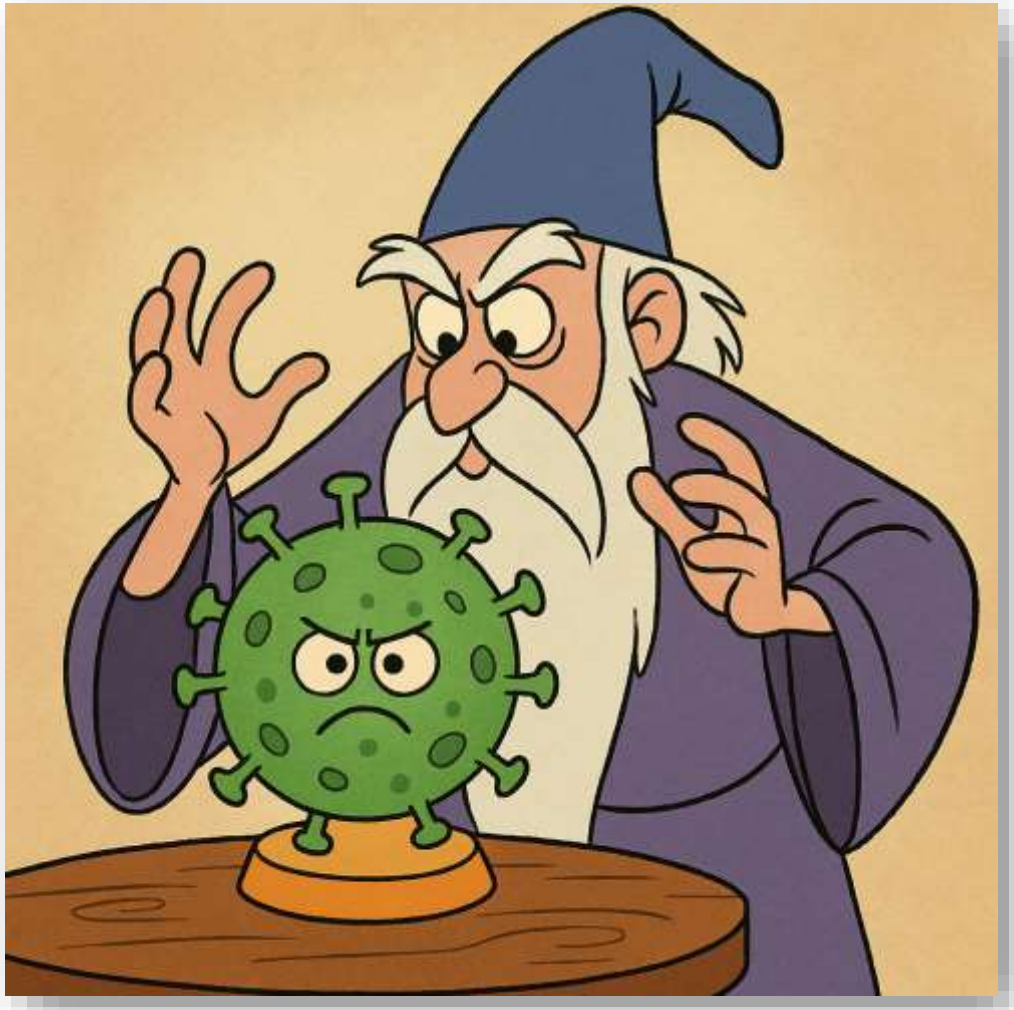
A real-time monitoring tool to automatically measure the feed intakes of multiple broiler chickens by sound analysis

A. Aydin [a,*], C. Bahr [b], D. Berckmans [b]

[a] Department of Agricultural Machinery and Technologies Engineering, Faculty of Agriculture, Canakkale Onsekiz Mart University, 17020 Canakkale, Turkey
[b] Division Measure, Model & Manage Bioresponses, KU Leuven, Kasteelpark Arenberg 30, B-3001 Heverlee, Belgium




EARLY WARNING
SYSTEM



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IDENTIFYING RALE SOUNDS IN CHICKENS USING AUDIO SIGNALS FOR EARLY DISEASE DETECTION IN POULTRY

*Muhammad Rizwan** *Brandon T. Carroll** *David V. Anderson** *Wayne Daley*†
Simeon Harbert† *Douglas F. Britton*† *Mark W. Jackwood*‡

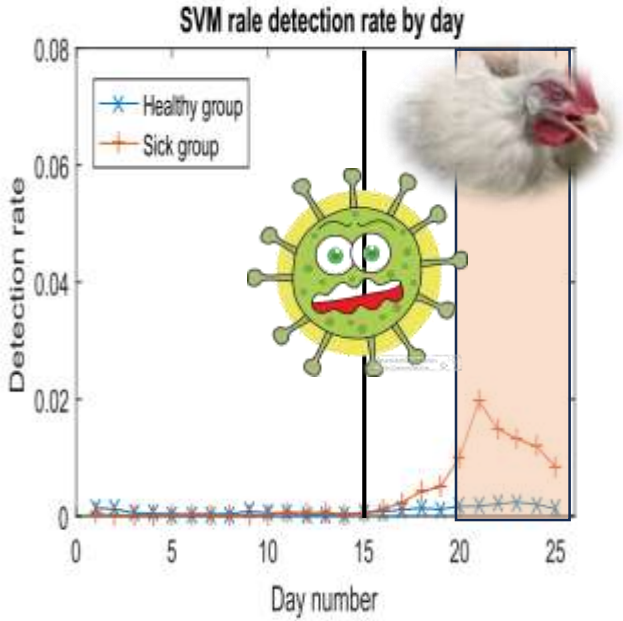
Table 1. Confusion matrix - ELM

Human Label \ Algorithm Label	None	Rale
None	8668	92
Rale	155	681

Table 2. Confusion matrix - SVM

Human Label \ Algorithm Label	None	Rale
None	8650	110
Rale	124	712

Infection Signs



Computers and Electronics in Agriculture 178 (2020) 105688

Contents lists available at ScienceDirect

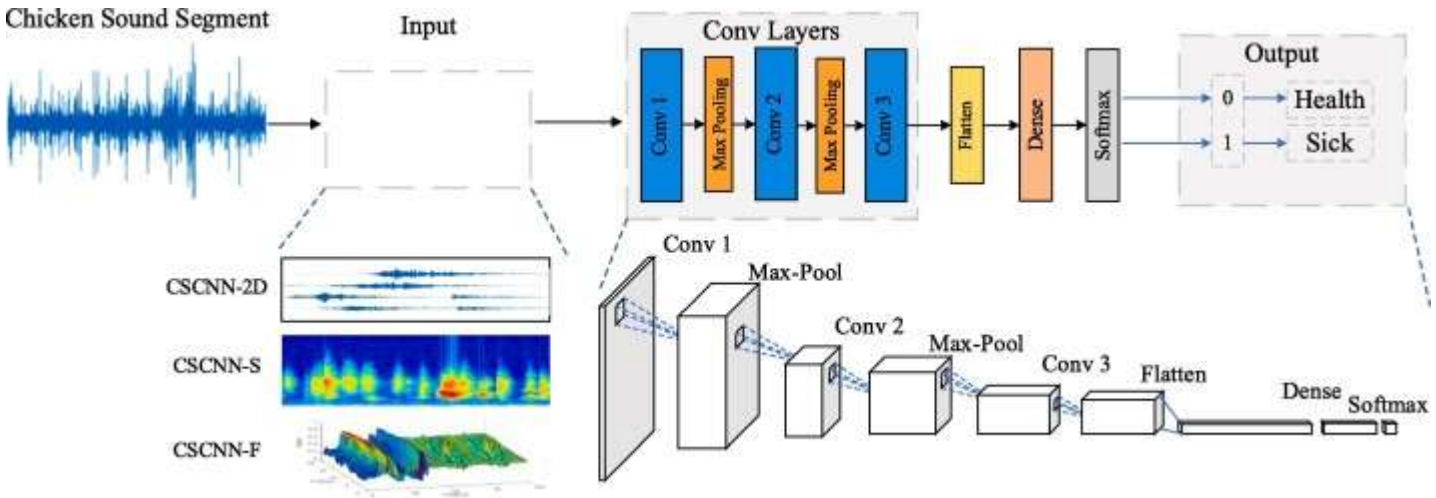
Computers and Electronics in Agriculture

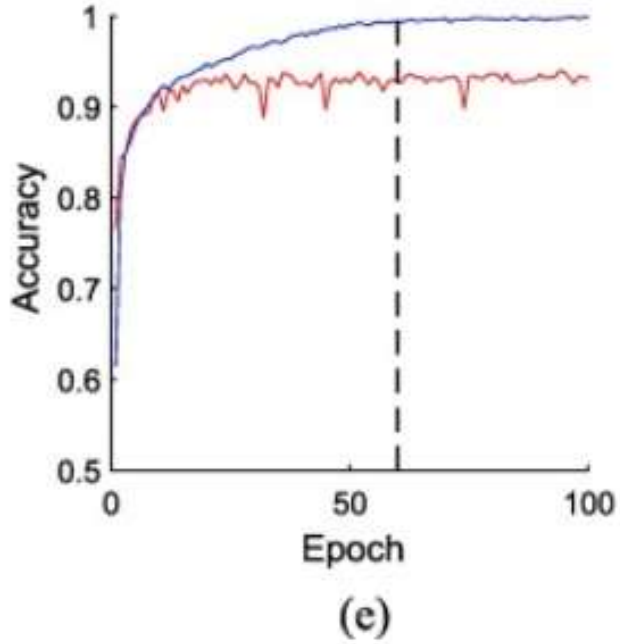
journal homepage: www.elsevier.com/locate/compag

Detection of avian influenza-infected chickens based on a chicken sound convolutional neural network

Kaixuan Cuan[a], Tiemin Zhang[a,b,c,*], Junduan Huang[a], Cheng Fang[a], Yun Guan[d]

[a] College of Engineering, South China Agricultural University, Guangzhou 510642, China
[b] Guangdong Laboratory for Lingnan Modern Agriculture, Guangzhou 510642, China
[c] National Engineering Research Center for Breeding Swine Industry, Guangzhou 510642, China
[d] College of Veterinary Medicine, South China Agricultural University, Guangzhou 510642, China





(e)


116w
122w
L
R
238 w

Contents lists available at ScienceDirect

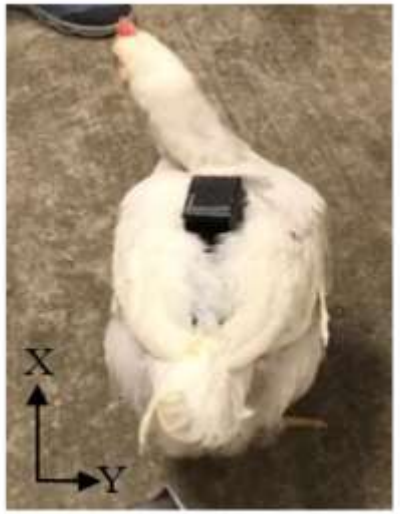
Animal

The international journal of animal biosciences

Classification of broiler behaviours using triaxial accelerometer and machine learning

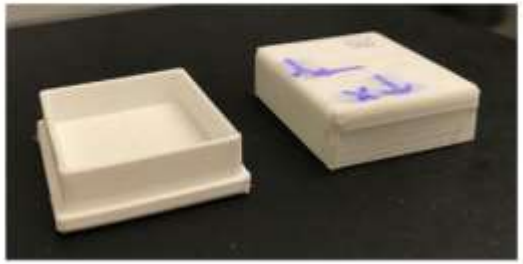
X. Yang [a], Y. Zhao [a,*], G.M. Street [b], Y. Huang [c], S.D. Filip To [d], J.L. Purswell [e]

[a] Department of Animal Science, The University of Tennessee, Knoxville, TN 37996, USA
[b] Department of Wildlife, Fisheries and Aquaculture, Mississippi State University, Mississippi State, MS 39762, USA
[c] United States Department of Agriculture, Agricultural Research Service, Crop Production Systems Research Unit, Stoneville, MS 38776, USA
[d] Department of Agricultural and Biological Engineering, Mississippi State University, Mississippi State, MS 39762, USA
[e] USDA Agricultural Research Service, Poultry Research Unit, Mississippi State, MS 39762, USA



(c)


(a)


(b)


(a)

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Special Issue: Environmental Stressors

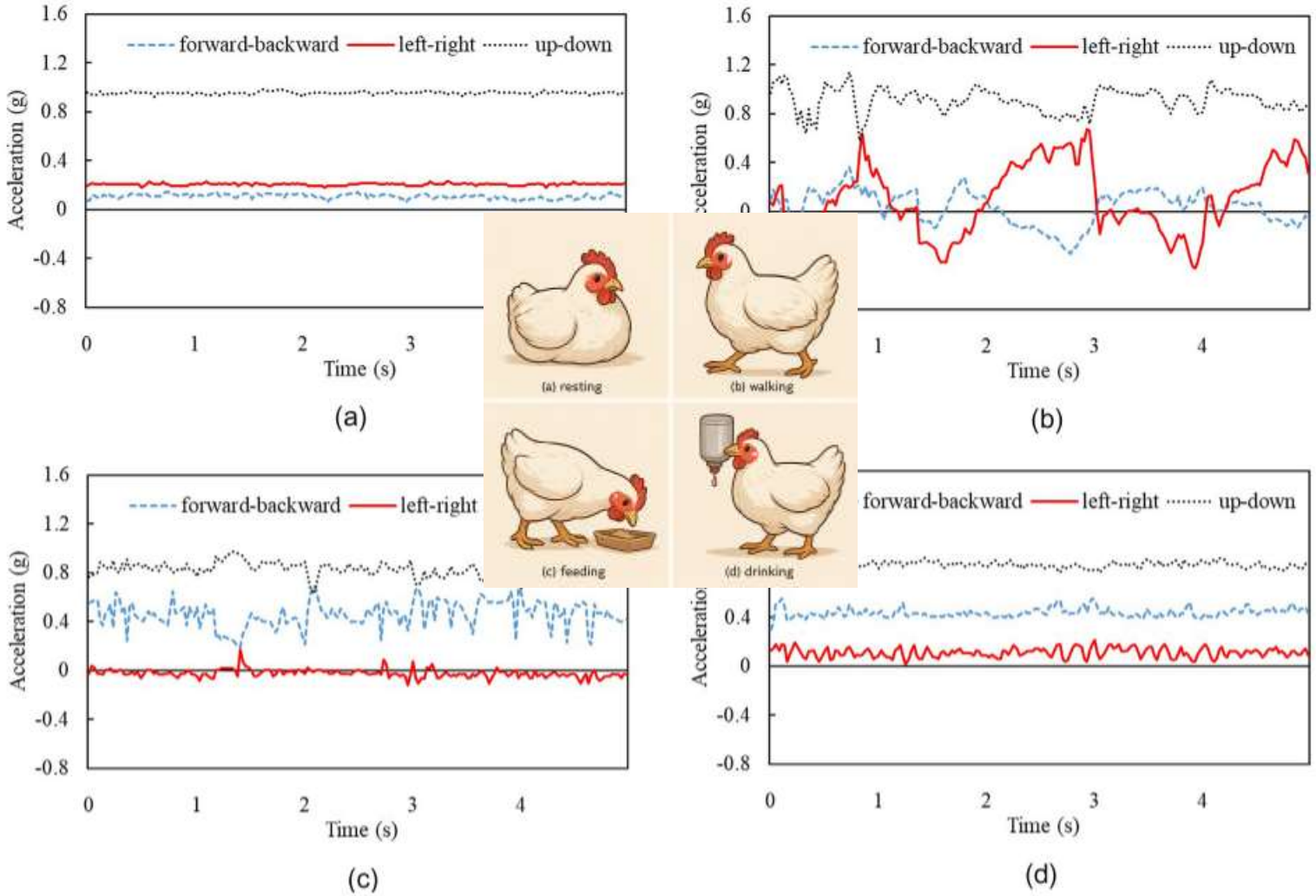
Research Paper

Automatic broiler temperature measuring by thermal camera

Victor Bloch [a], Natan Barchilon [a,b], Ilan Halachmi [a], Shelly Druyan [a,b,*]

[a] Precision Livestock Farming (PLF) Laboratory, Institute of Agricultural Engineering, Agricultural Research Organization (ARO) – The Volcani Centre, Rishon Lezion, 7528809, Israel

[b] Institute of Animal Science, Agricultural Research Organization (ARO), The Volcani Center, 68 HaMakkabbim Road, Rishon Le Ziyyon P. O. Box 15159, Israel


forward-backward
left-right
up-down
Acceleration (g)
Time (s)
(a)
(b)
(c)
(d)
(a) resting
(b) walking
(c) feeding
(d) drinking

Computers and Electronics in Agriculture 136 (2017) 140–146

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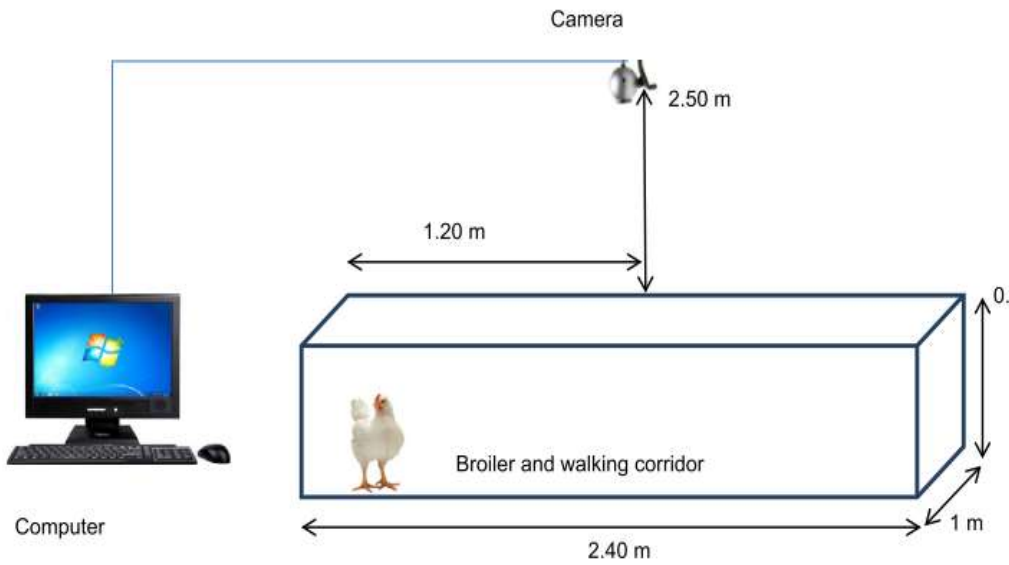
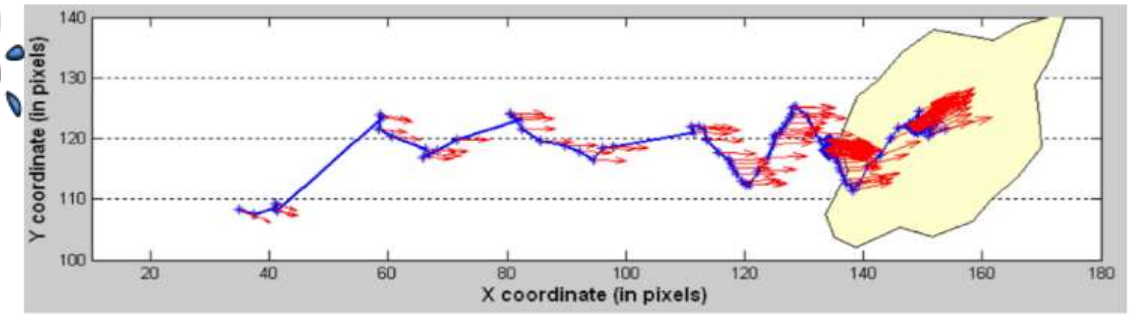
journal homepage: www.elsevier.com/locate/compag

Original papers

Development of an early detection system for lameness of broilers using computer vision





(a) Gait Score 1

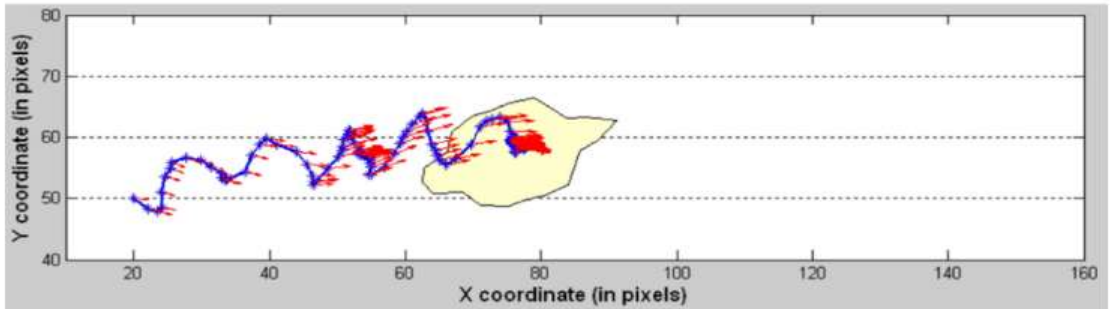


Table 3
The statistical results of the feature variables of broilers.

Gait scores	Step frequency Mean ± std	Step length (cm) Mean ± std	Speed (m/s) Mean ± std	LBO (cm^2) Mean ± std
GS0	36 ± 1.54^a	14.17 ± 0.29^a	0.157 ± 0.006^a	1675.21 ± 15.16^a
GS1	35 ± 1.15^a	14.57 ± 0.26^a	0.151 ± 0.007^a	1709.27 ± 18.55^a
GS2	37 ± 1.31^a	13.78 ± 0.31^a	0.166 ± 0.005^a	1627.60 ± 12.37^a
GS3	45 ± 1.54^b	11.33 ± 0.24^b	0.112 ± 0.006^b	2146.80 ± 19.41^b
GS4	72 ± 1.54^c	07.08 ± 0.25^c	0.074 ± 0.005^c	2686.86 ± 16.04^c

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Research

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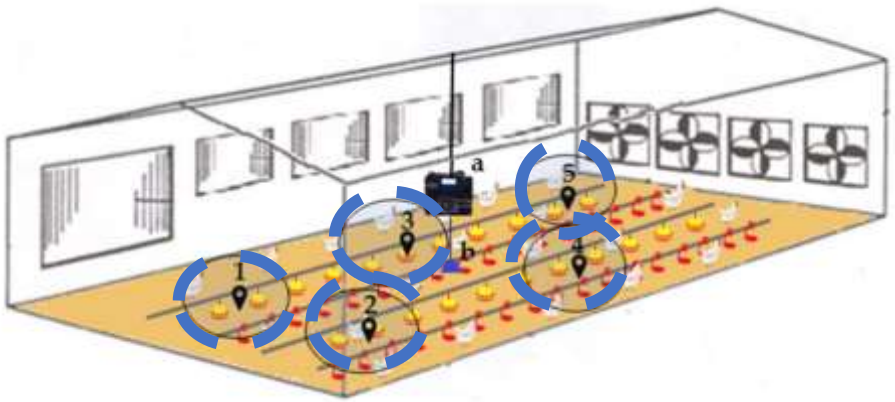
Monitoring chicken flock behaviour provides early warning of infection by human pathogen *Campylobacter*

Frances M. Colles[1], Russell J. Cain[1], Thomas Nickson[2], Adrian L. Smith[1], Stephen J. Roberts[2], Martin C. J. Maiden[1], Daniel Lunn[3] and Marian Stamp Dawkins[1]



31 allevamenti commerciali

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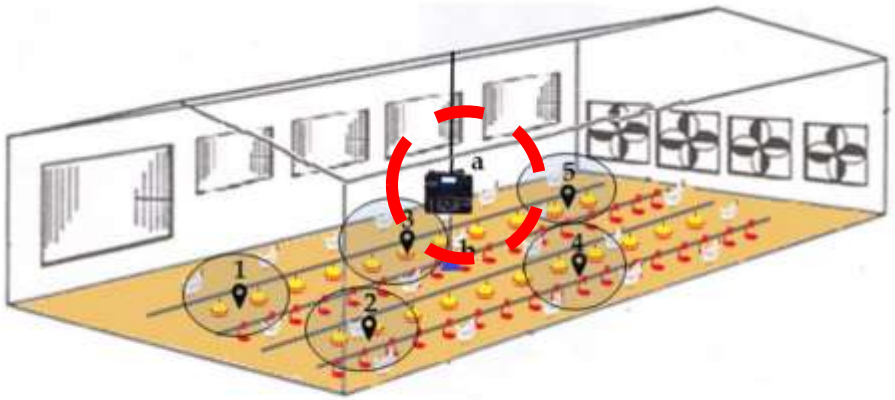
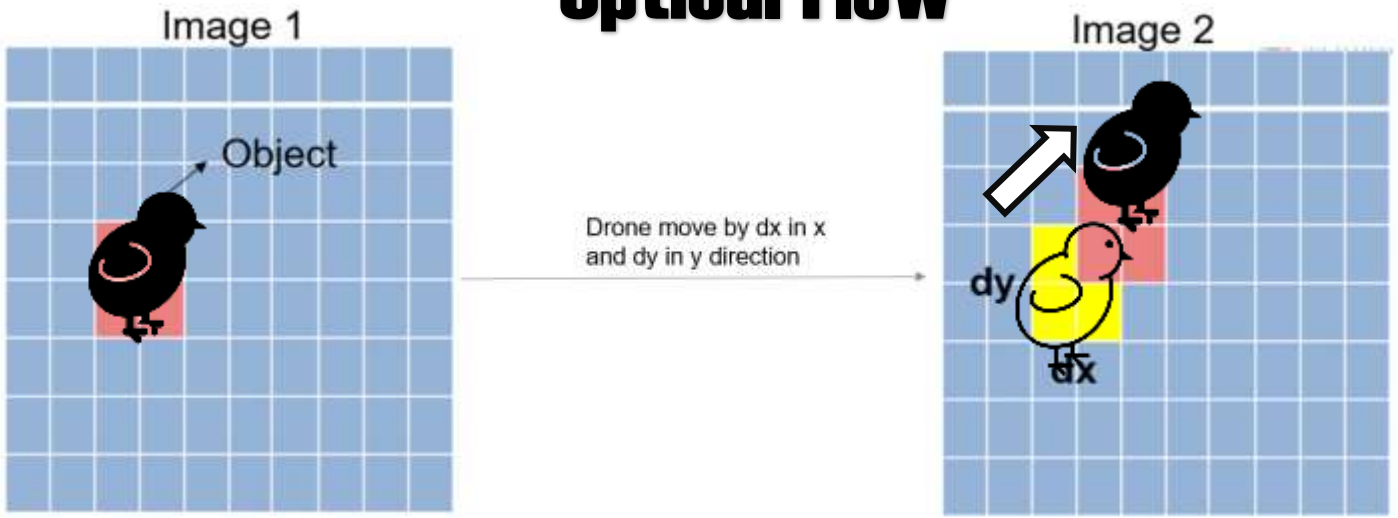


Figure 1. Illustration of the faeces sampling zones (1–5), the position of the device within the shed (**a**), and the air collection point (**b**).

Optical Flow



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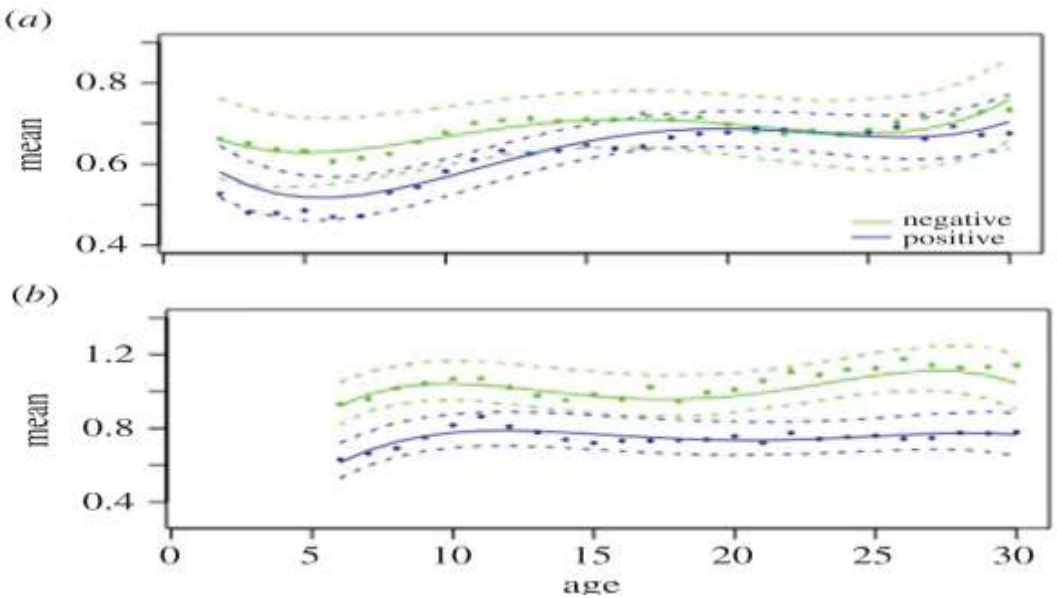
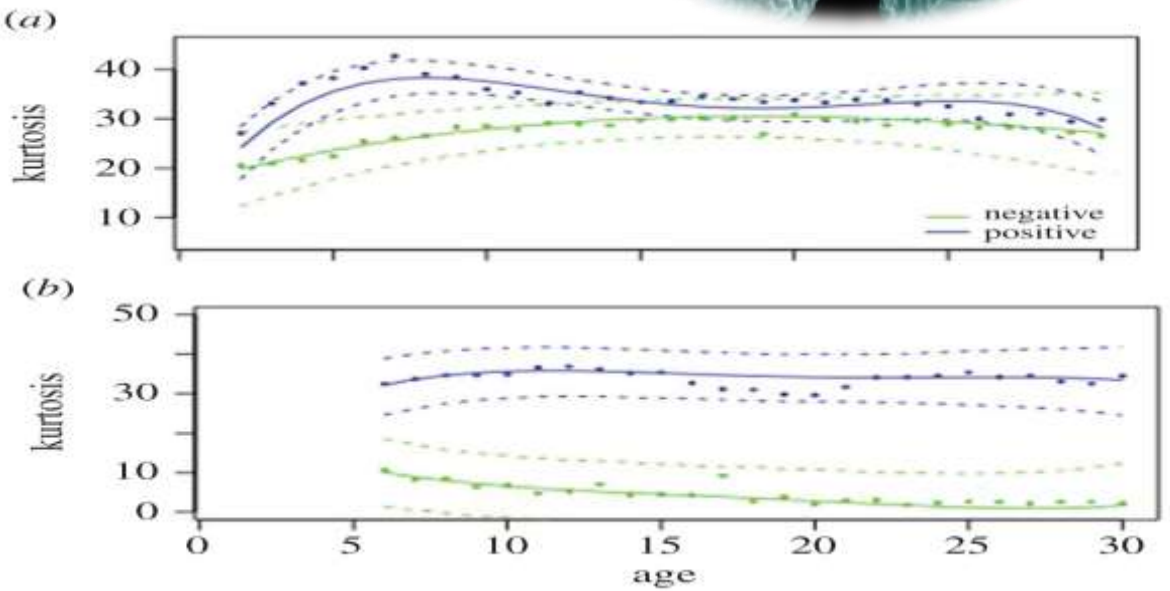
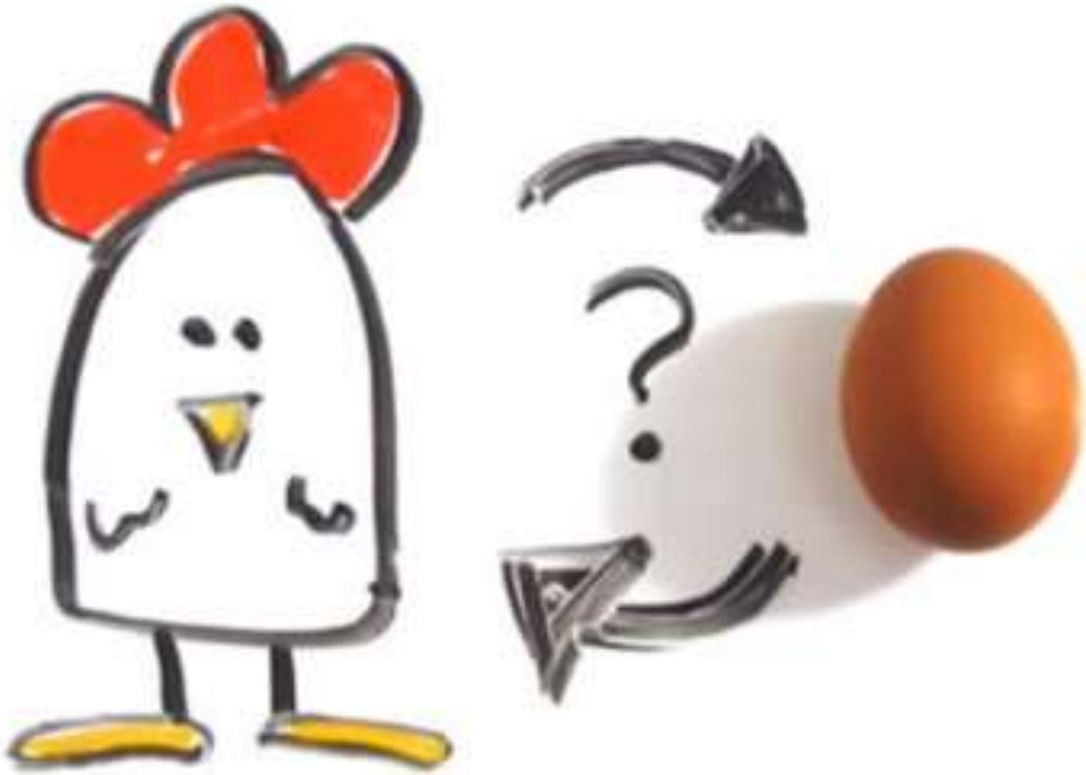


Minor optical flow medio (Minor media movimento)



Maggior kurtosis (Movimenti meno uniformi)

"The Chicken -or- The Chicken Egg"



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animals

MDPI

Article

A Data-Driven Prediction Method for an Early Warning of Coccidiosis in Intensive Livestock Systems: A Preliminary Study

Federica Borgonovo [1], Valentina Ferrante [1,*], Guido Grilli [2], Riccardo Pascuzzo [3], Simone Vantini [4] and Marcella Guarino [1]

ELECTRONIC NOSE

MAPS

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animals

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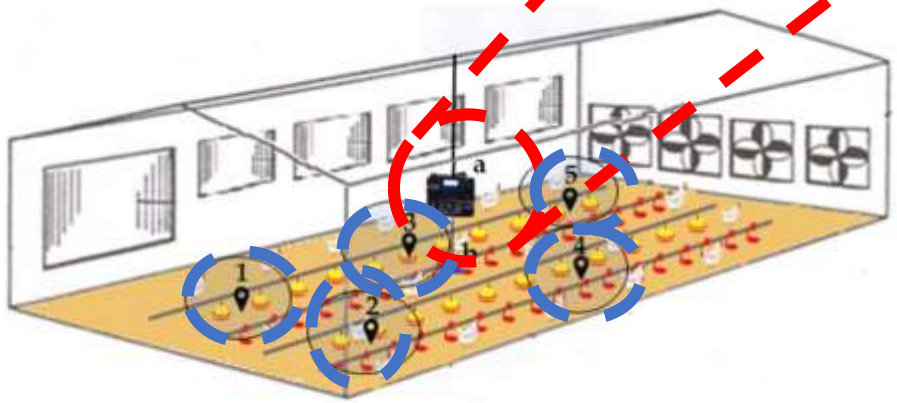

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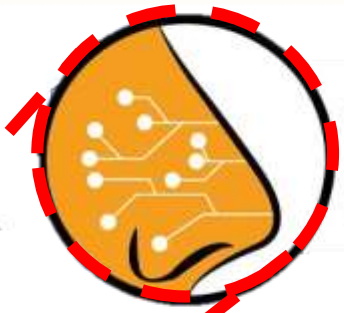
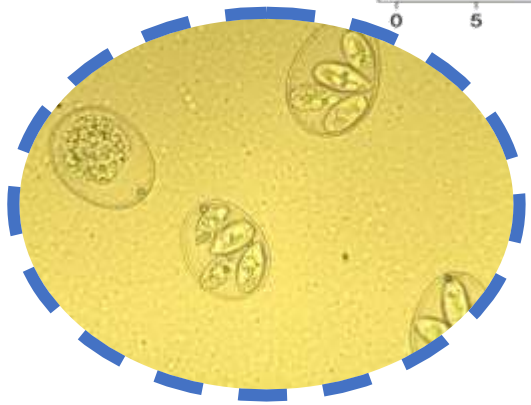
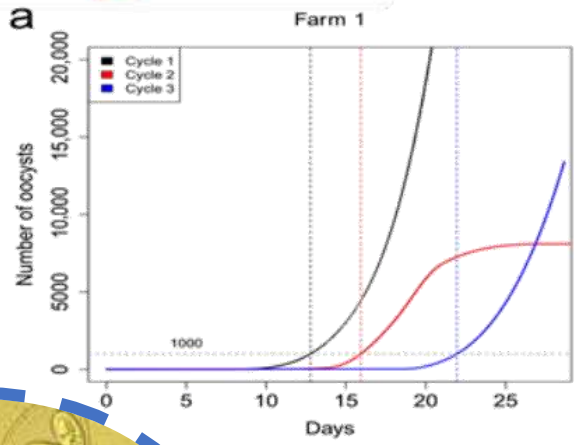


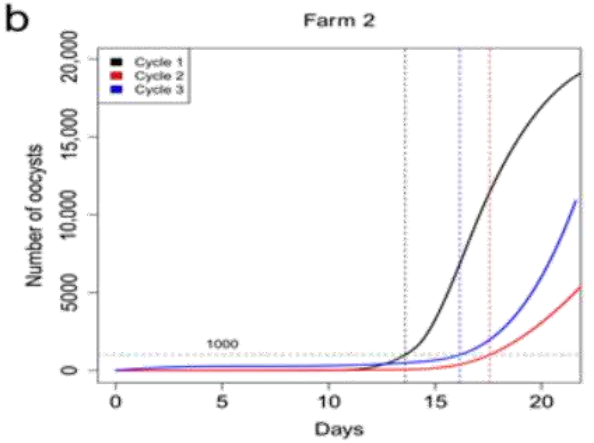
ELECTRONIC NOS

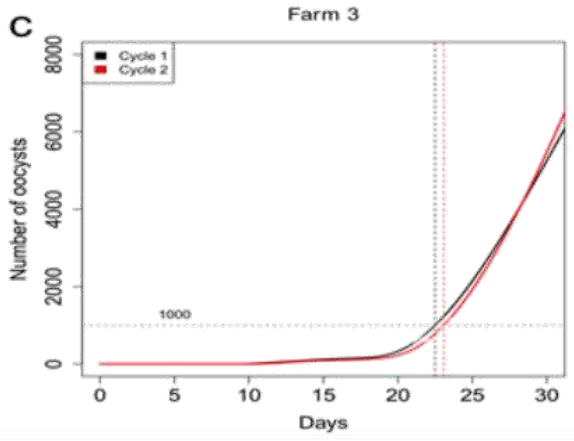
Volatile organic compounds (VOC)



1000 oocystis/grammo







MAPS

UNIVERSITÀ DEGLI STUDI DI PADOVA

animals

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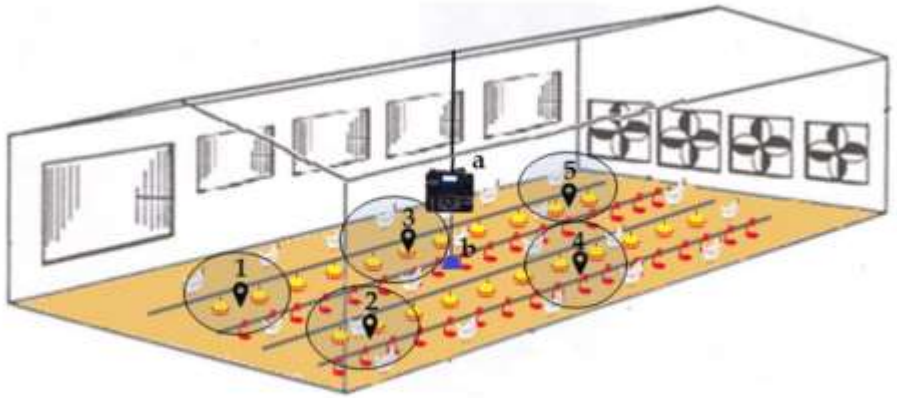

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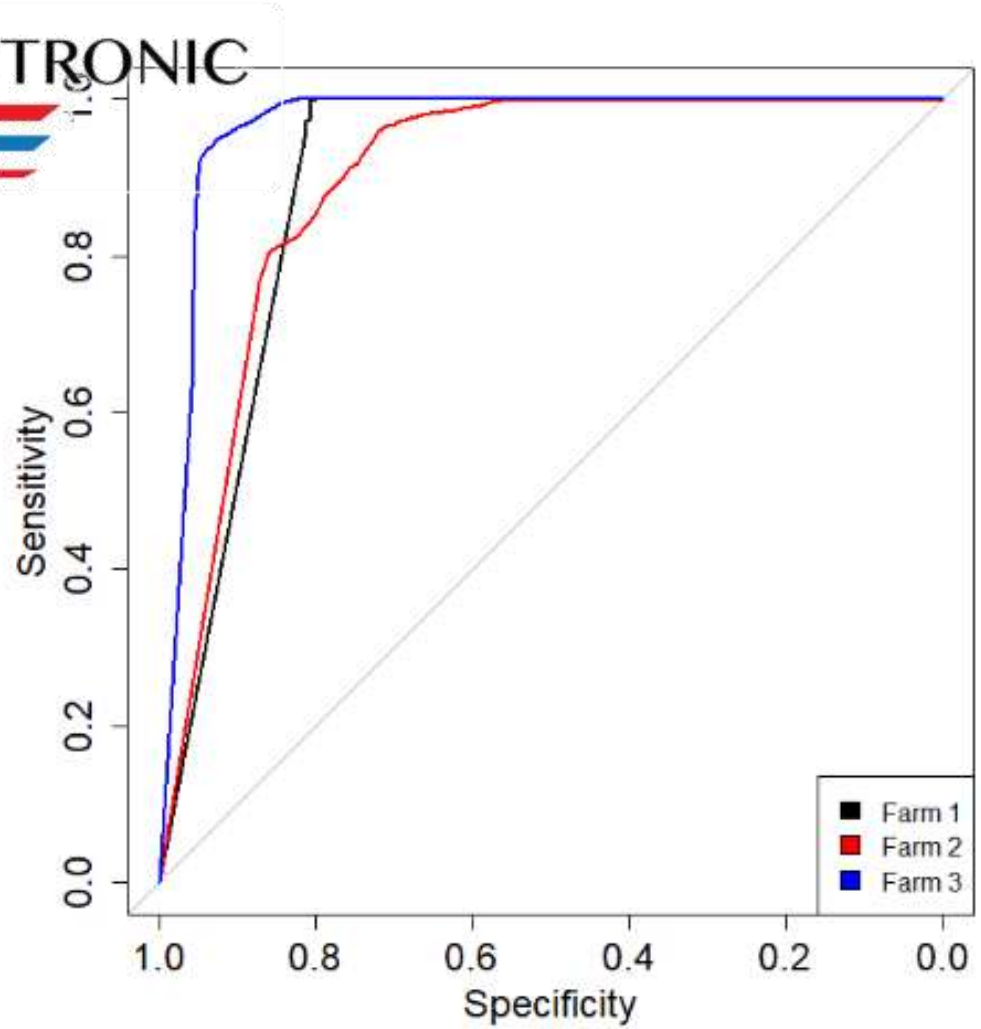
ELECTRONIC NOS




200ft
Bernal Road
Bernal Road
GARMIN
73° 10:10
ROAD
Navigation
Training
IQ
GARMIN
Alltricks

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frontiers | Frontiers in Veterinary Science

TYPE Original Research
PUBLISHED 04 November 2022
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Technologies monitoring and improving biosecurity compliance in barn anterooms

Manon Racicot[1]*, Anne-Marie Cardinal[2], Dominic Tremblay[3] and Jean-Pierre Vaillancourt[2]

[1]Department of Pathology and Microbiology, Faculty of Veterinary Medicine, Université de Montréal, Montreal, QC, Canada, [2]Department of Clinical Sciences, Faculty of Veterinary Medicine, Université de Montréal, Montreal, QC, Canada, [3]Institut de technologie Agroalimentaire du Québec, Programme de technologie des productions animales, St-Hyacinthe, QC, Canada

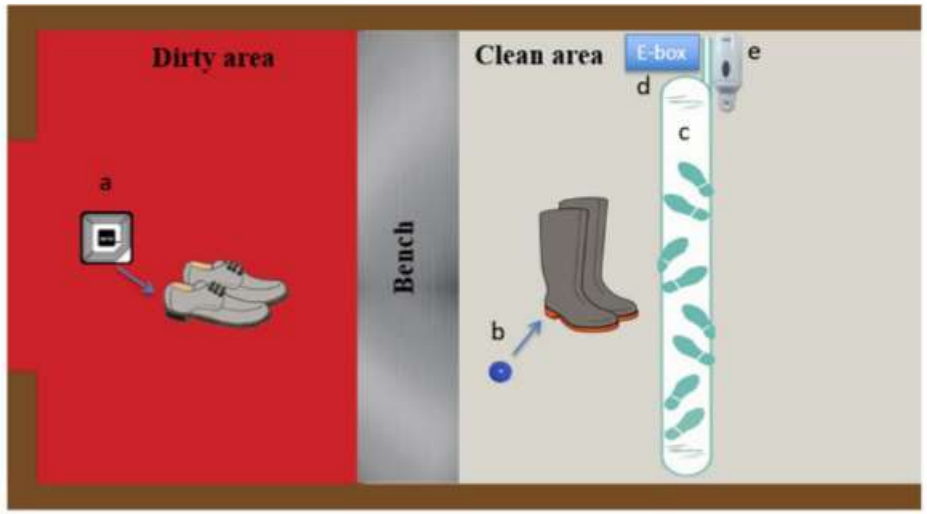

FIGURE 1
MediHandTrace adapted Radio-frequency-identification-based (RFID) real-time continuous automated monitoring system. **(a)** Soft chips inserted in work shoes used by personnel getting to the farm; **(b)** rigid chips inserted in the soles of farm boots; **(c)** RFID antenna; **(d)** *MediHandTrace* device (e-box) with data management program; **(e)** hand sanitizer device.

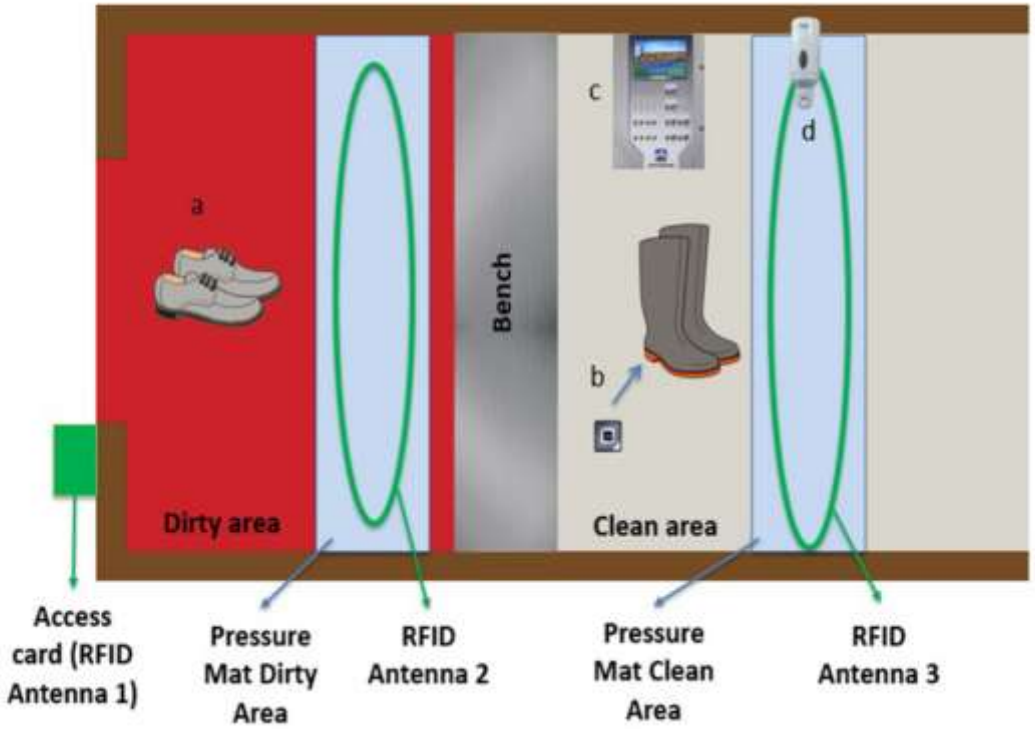

FIGURE 6
Dirty area of the turkey barn (pressure mat and antenna located on the floor)—Maximus prototype.

FIGURE 7
Clean area of the turkey barn (pressure mat and antenna located on the floor connected to the hand sanitizer device)—Maximus prototype.

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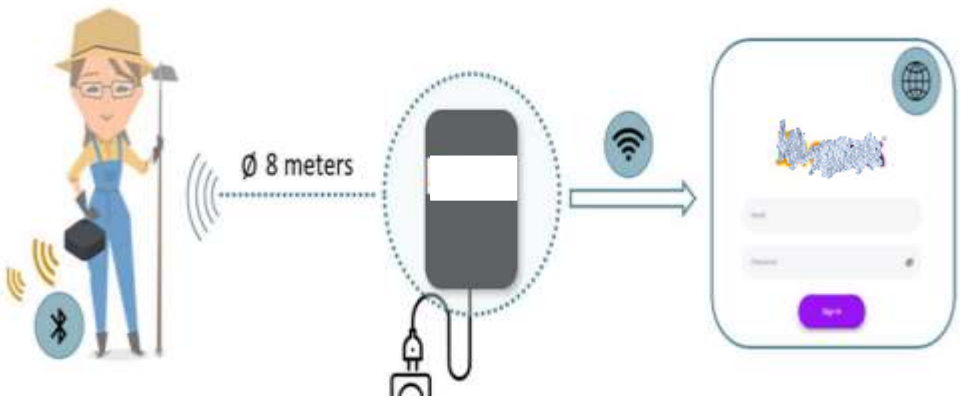
Bernaerdt *et al. Porcine Health Management* (2023) 9:11
https://doi.org/10.1186/s40813-023-00310-4

Porcine Health Management

RESEARCH **Open Access**

Optimizing internal biosecurity on pig farms by assessing movements of farm staff

Elise Bernaerdt[1*], Inmaculada Díaz[2], Carlos Piñeiro[2], Miquel Collell[3], Jeroen Dewulf[4] and Dominiek Maes[1]



From: \ To:	Dressing	Farrowing	Gestation/ insemination	Nursery	Fattening	Quarantine	Cadaver
Dressing	safe	safe	safe	safe	safe	safe	safe
Farrowing	safe	safe	safe	safe	safe	safe	safe
Gestation/ insemination	safe	risky	safe	safe	safe	safe	safe
Nursery	safe	risky	risky	safe	safe	safe	safe
Fattening	safe	risky	risky	risky	safe	safe	safe
Quarantine	safe	risky	risky	risky	risky	risky	safe
Cadaver	safe	risky	risky	risky	risky	risky	safe

	Total number of movements	Percentage of risky movements
Farm A		
Weaning	32^{a} (2–76)	11^{a} (0–30)
Insemination	32^{a} (9–75)	9^{a} (0–32)
Farrowing	33^{a} (13–90)	11^{a} (0–35)
Farm B		
Weaning	32^{ab} (2–633)	33^{a} (0–52)
Insemination + farrowing	53^{a} (2–348)	33^{a} (0–46)
No main activities 1	33^{b} (1–349)	33^{a} (0–45)
No main activities 2	38^{b} (2–320)	32^{a} (0–50)
Farm C		
Weaning	58^{a} (21–244)	38^{a} (10–46)
Insemination + farrowing	64^{a} (14–236)	35^{b} (17–47)
No main activities 1	49^{b} (14–166)	36^{ab} (20–44)
No main activities 2	41^{c} (13–103)	36^{ab} (8–50)
Farm D		
Weaning	71^{ab} (10–247)	16^{a} (6–27)
Insemination + farrowing	85^{a} (8–210)	14^{ab} (4–27)
No main activities 1	66^{bc} (2–173)	15^{ab} (0–32)
No main activities 2	52^{c} (7–273)	13^{b} (0–28)
Farm E		
Weaning	43^{ab} (5–487)	14^{a} (0–44)
Insemination + farrowing	57^{a} (2–351)	10^{a} (0–60)
No main activities 1	31^{ab} (1–629)	12^{a} (0–40)
No main activities 2	35^{b} (1–544)	14^{a} (0–40)

^{abc} Within each farm and within a column, values with different superscript differed significantly ($p < 0.05$)

According to the results of the Biocheck.UGent™ questionnaire, all farms except for farm B claimed to organize their work consistently starting with the young animals and then continuing the work in the older animals. However, the results of the present study did not confirm this,

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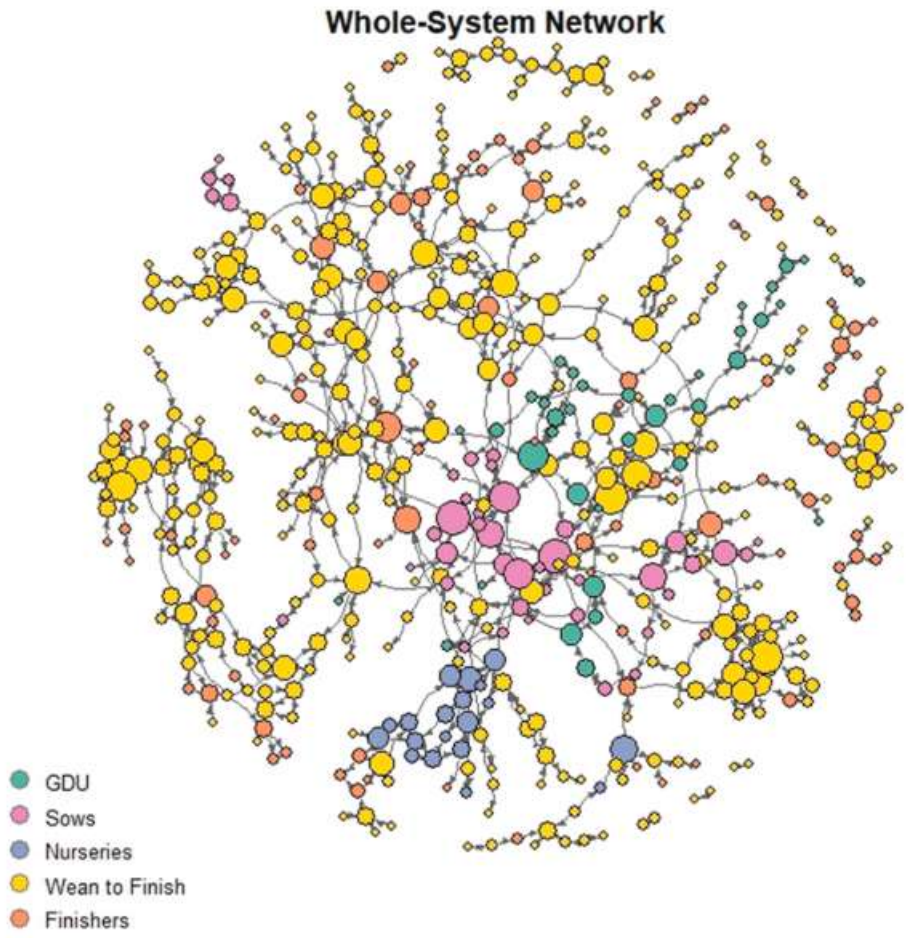
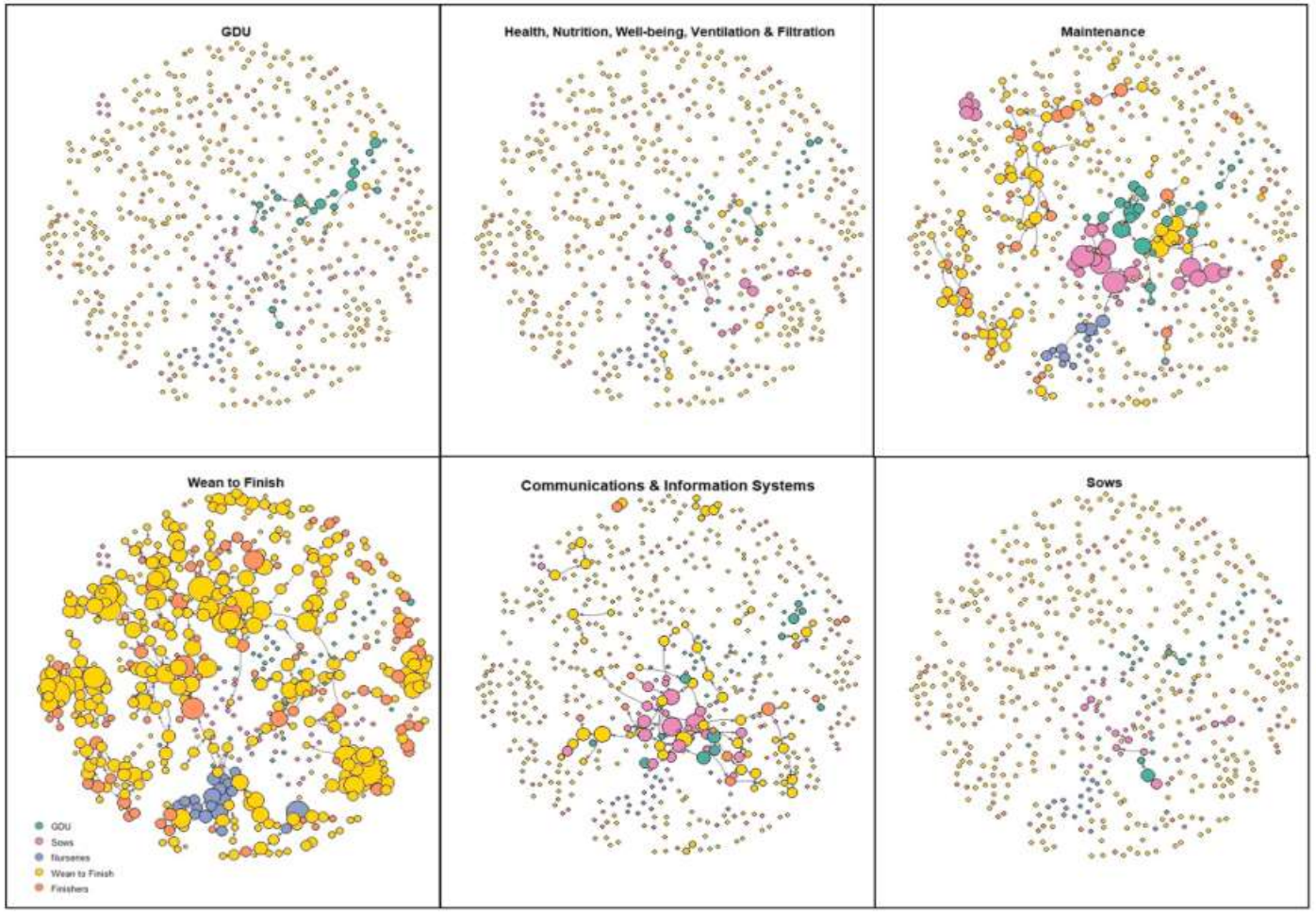
Farms contact network



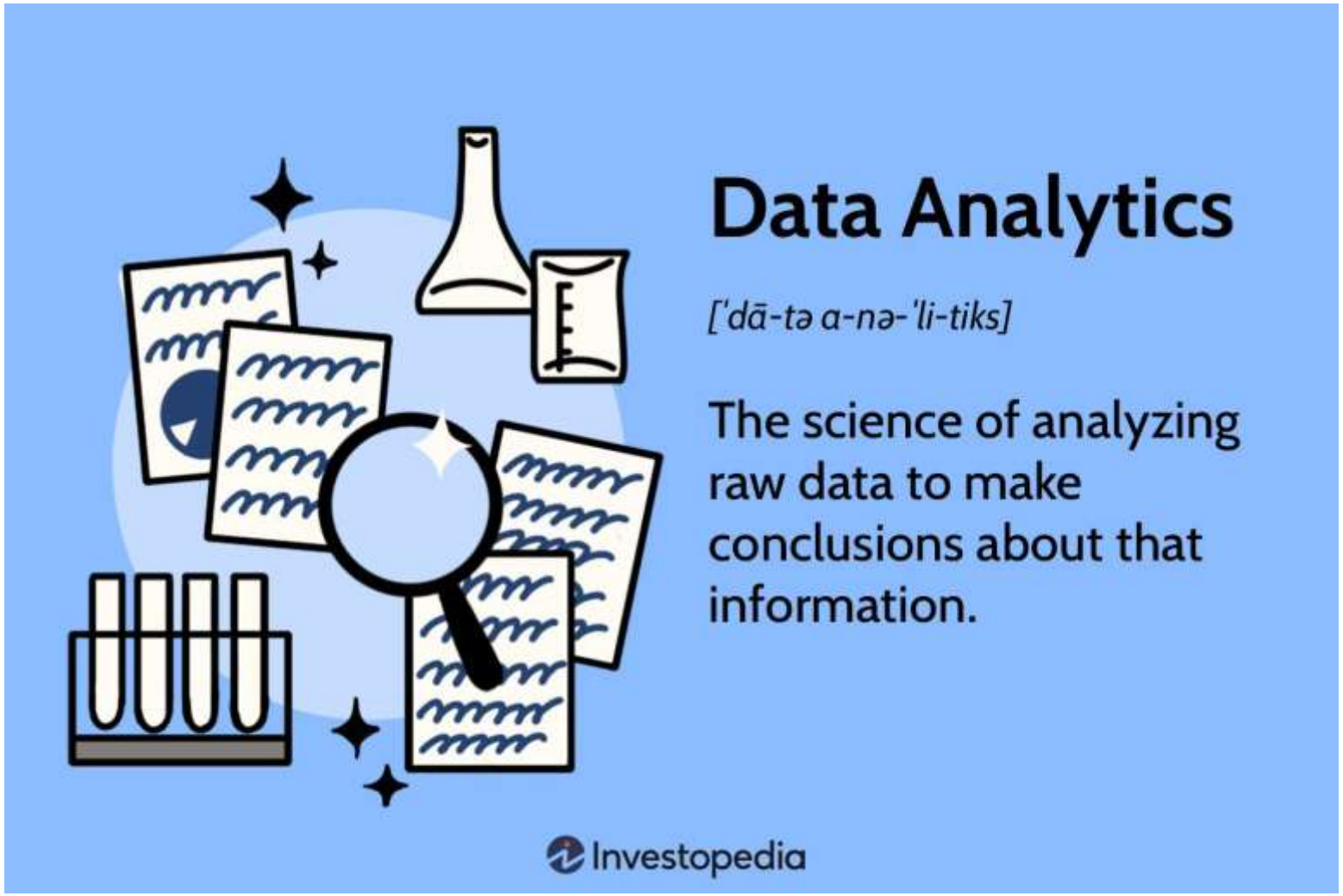
Farms contact network per categorie di dipendenti

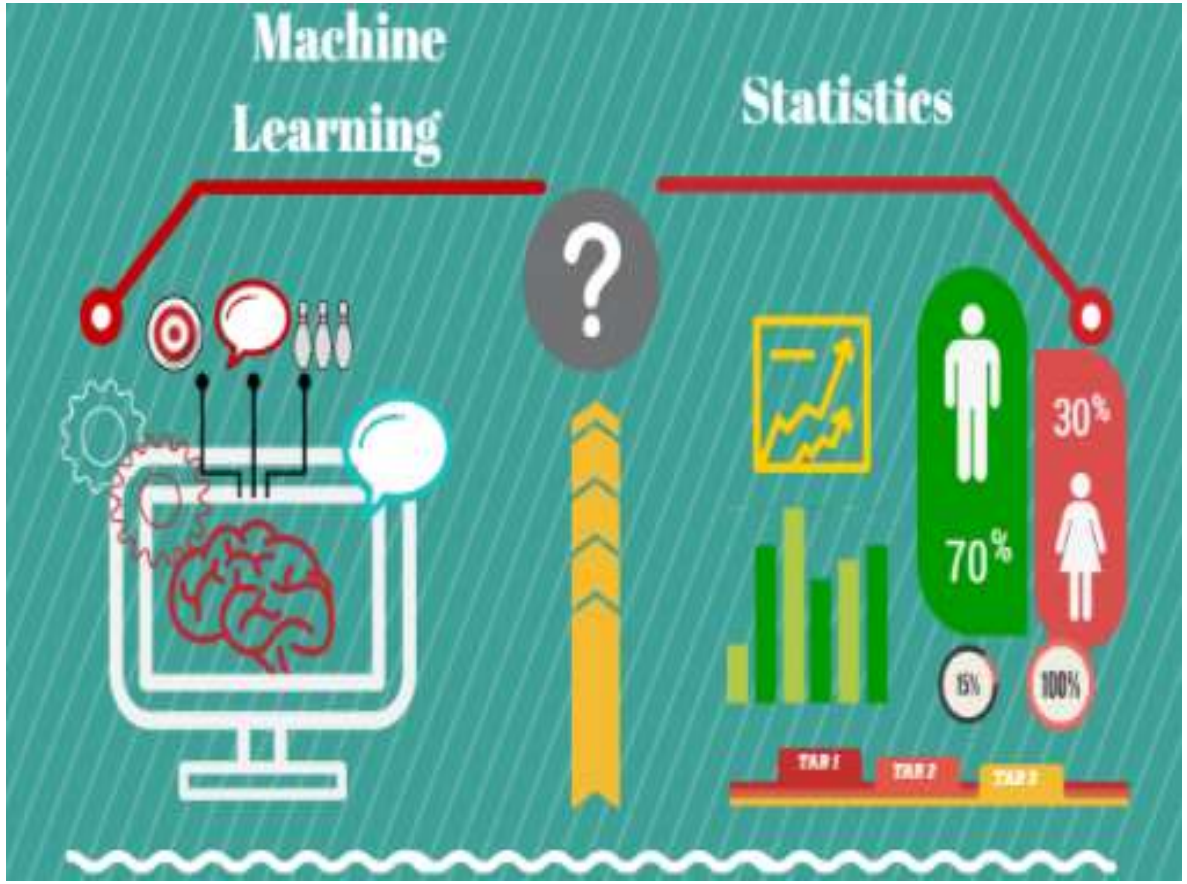


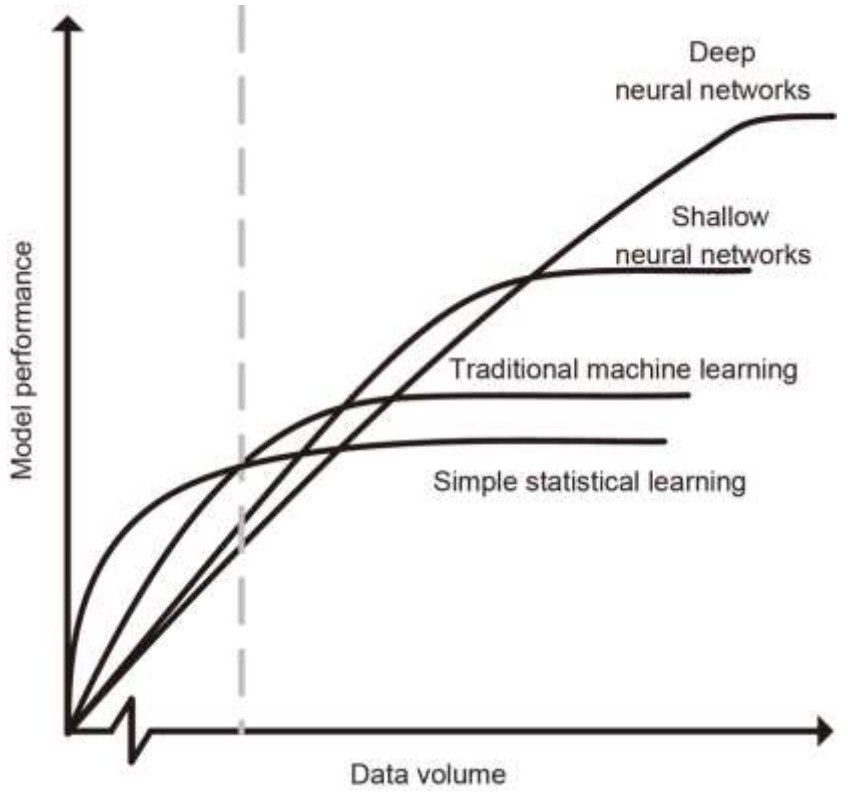

Agordo
Ristorante Caffè Pizzeria Stella
74,7 km
4h 30min
Maniago
Vittorio Veneto
Conegliano
Via Pordenone
214 km
4h 53mir
Montebelluna
Oderzo
Treviso
San Donà di Piave
Eraclea
Noale
Mogliano Veneto
Jesolo Lido di Jesolo
Venezia

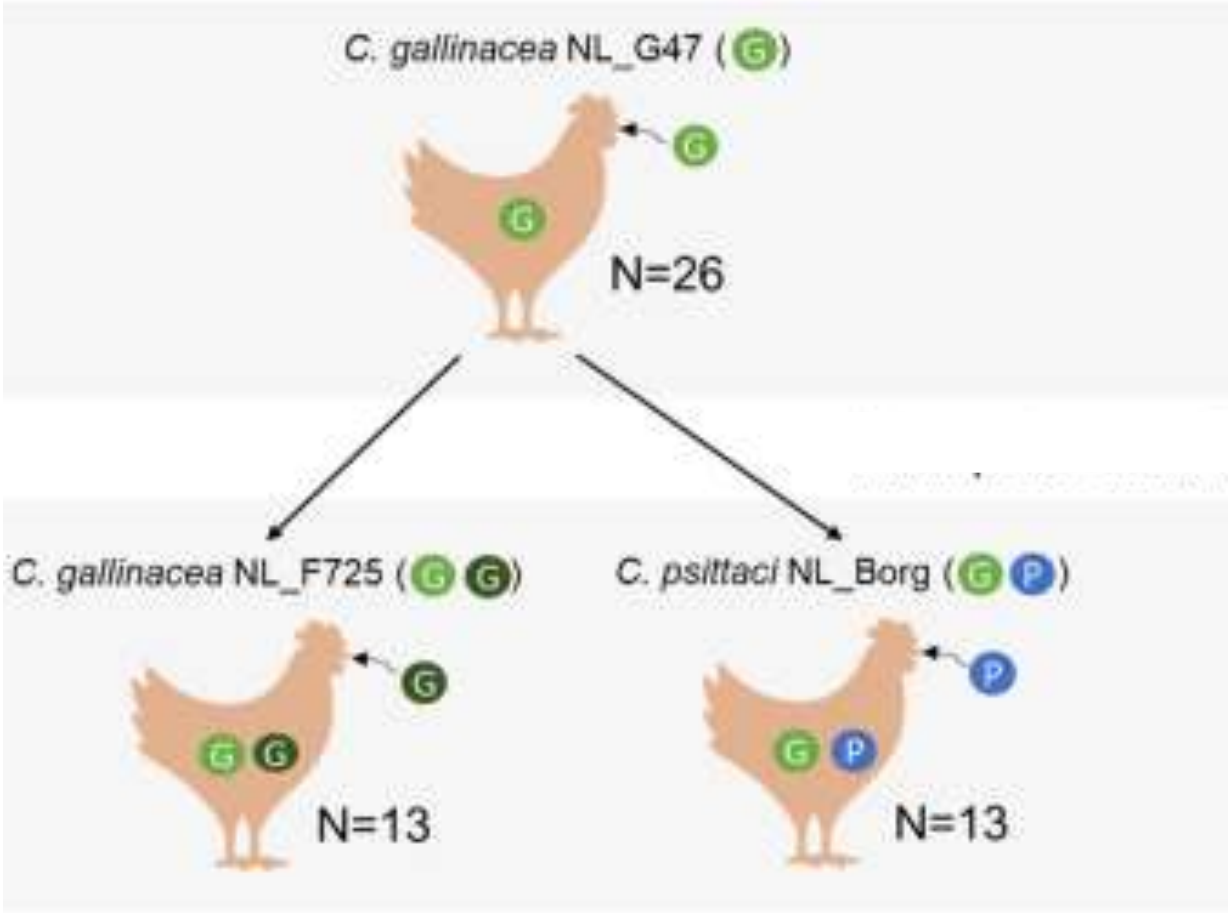

DATA

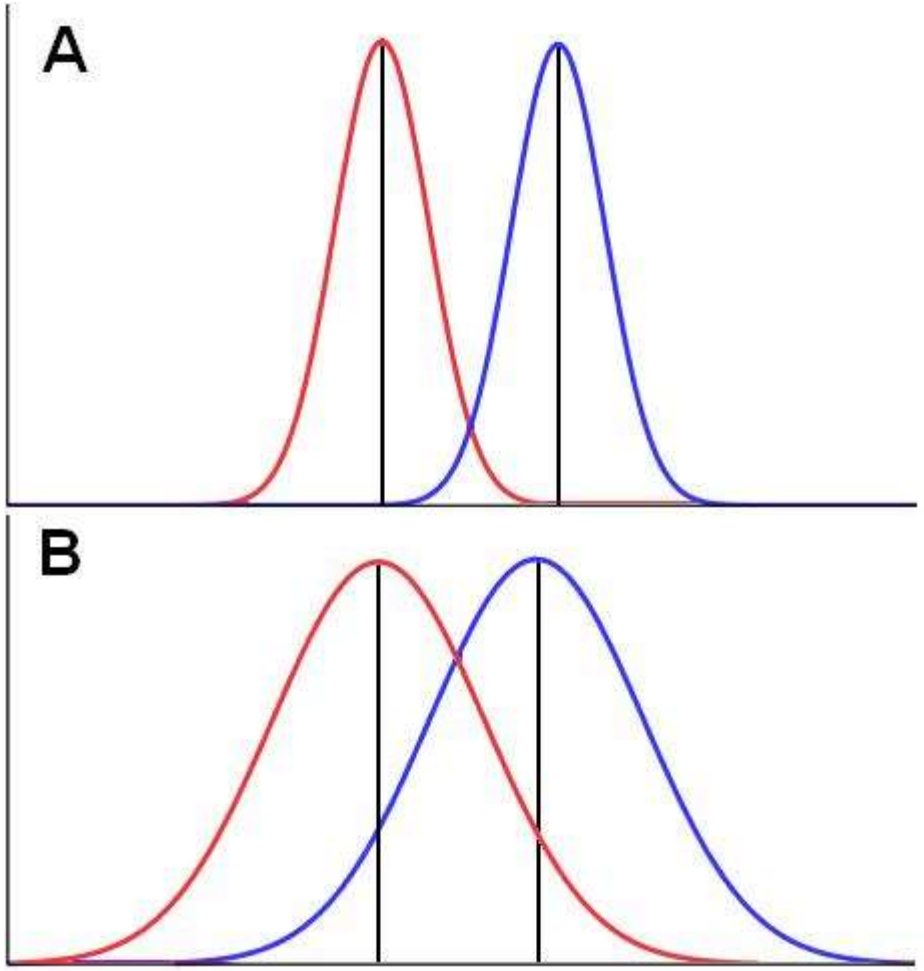

ROBERTO MANGOSI


Data Analytics
['dā-tə a-nə-'li-tiks]
The science of analyzing raw data to make conclusions about that information.
Investopedia

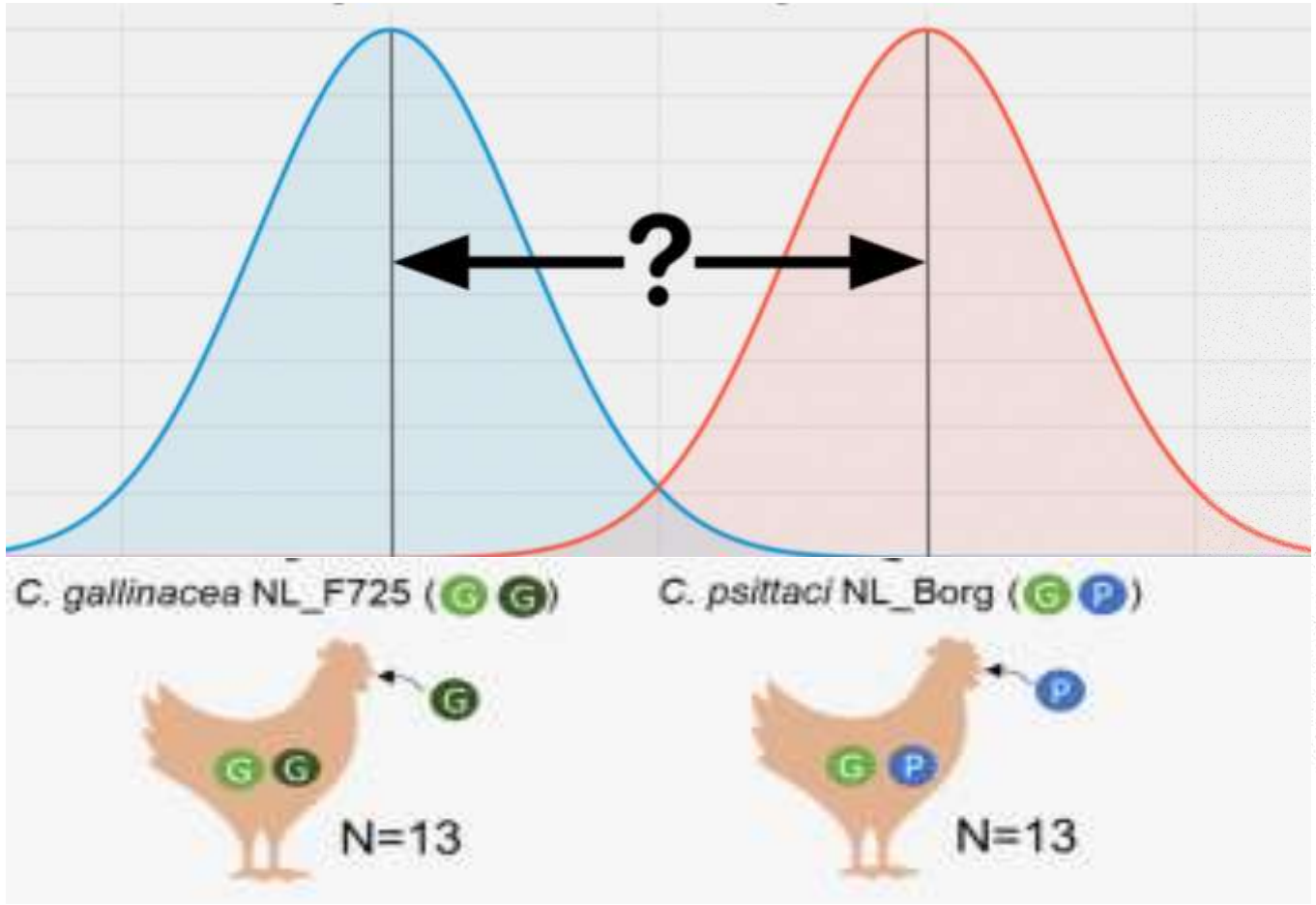

Machine Learning
Statistics
?
30%
70%
15%
100%

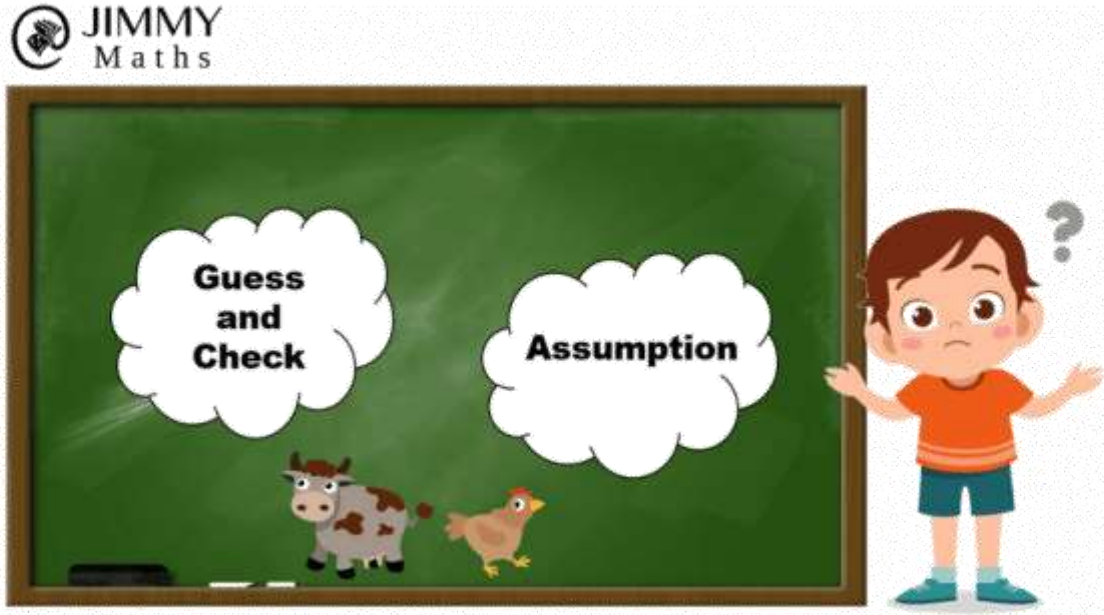

Deep neural networks
Shallow neural networks
Traditional machine learning
Simple statistical learning
Model performance
Data volume


C. gallinacea NL_G47 (G)
G
G
N=26
C. gallinacea NL_F725 (G G)
G
G G
N=13
C. psittaci NL_Borg (G P)
P
G P
N=13

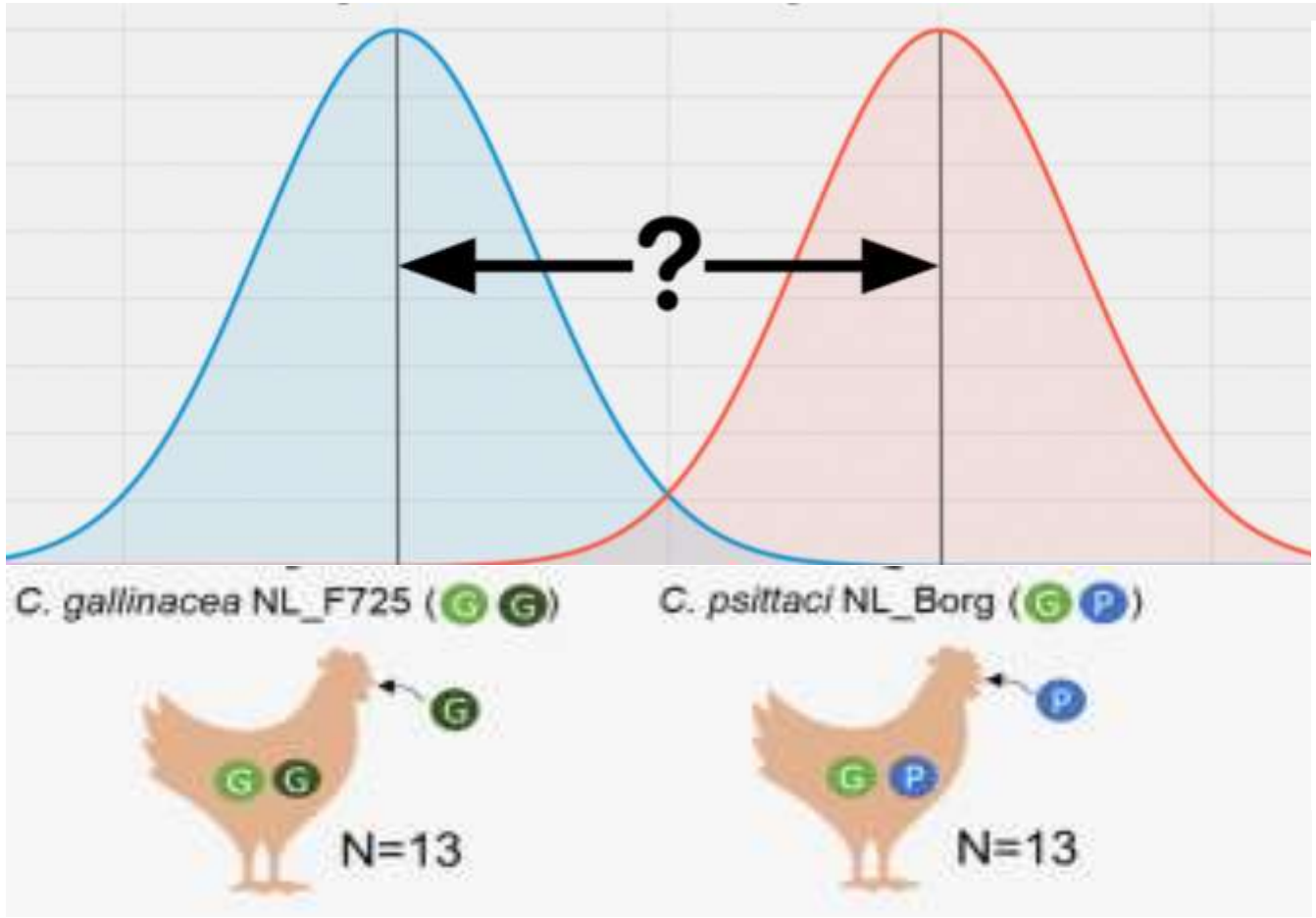

A
B

t-test


?
C. gallinacea NL_F725 (G G)
C. psittaci NL_Borg (G P)
G
G G
N=13
P
G P
N=13

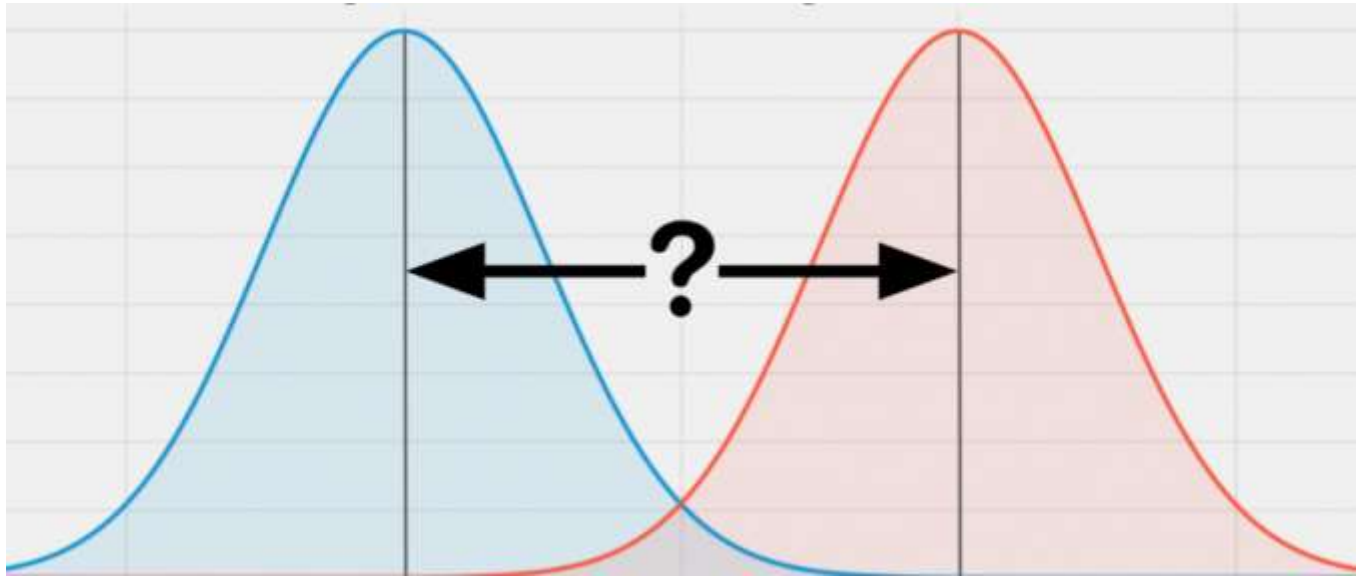

JIMMY
Maths
Guess and Check
Assumption
?

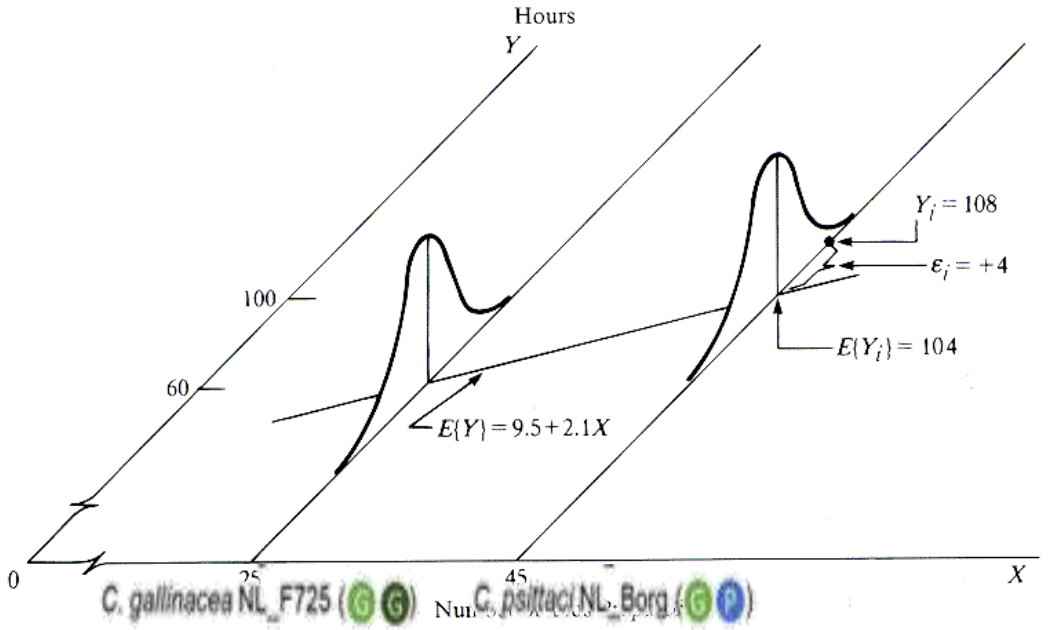
t-test



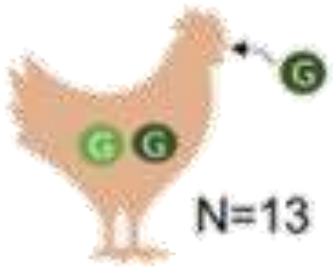
- The variables must be measured at either the interval or ratio level of measurement.
- The two groups from which you collect the data must be independent of one another.
- The data must be normally distributed.
- The variance in the population must be equal for both groups, which means they are not statistically significantly different. This is also called the assumption of homogeneity of variances.

t-test

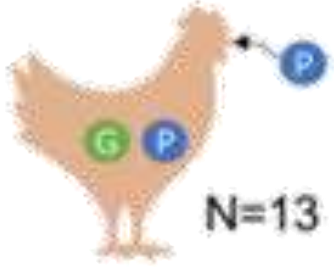


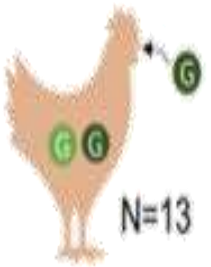


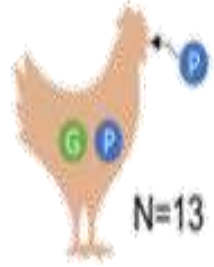
C. gallinacea NL_F725 (G G)

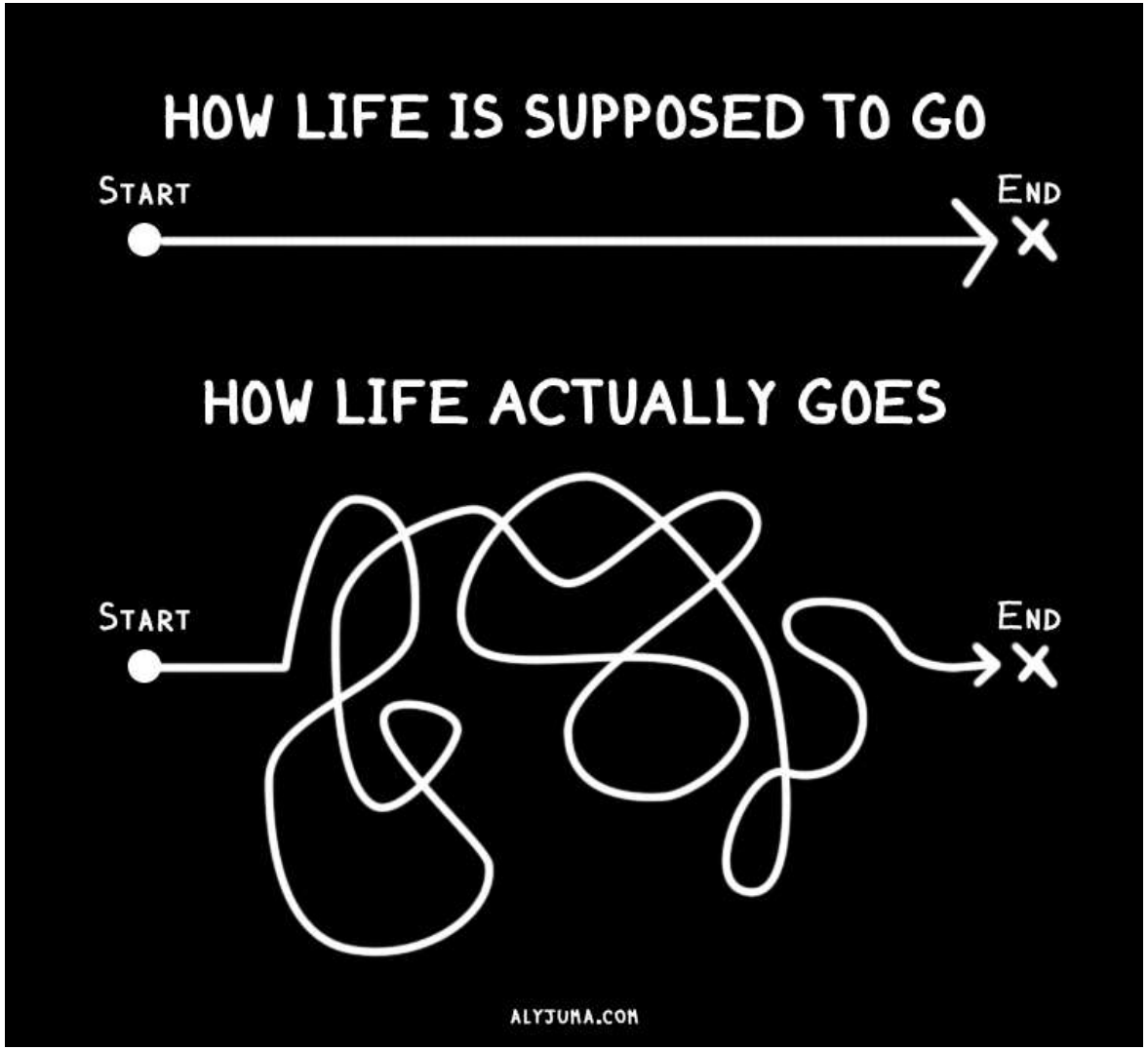


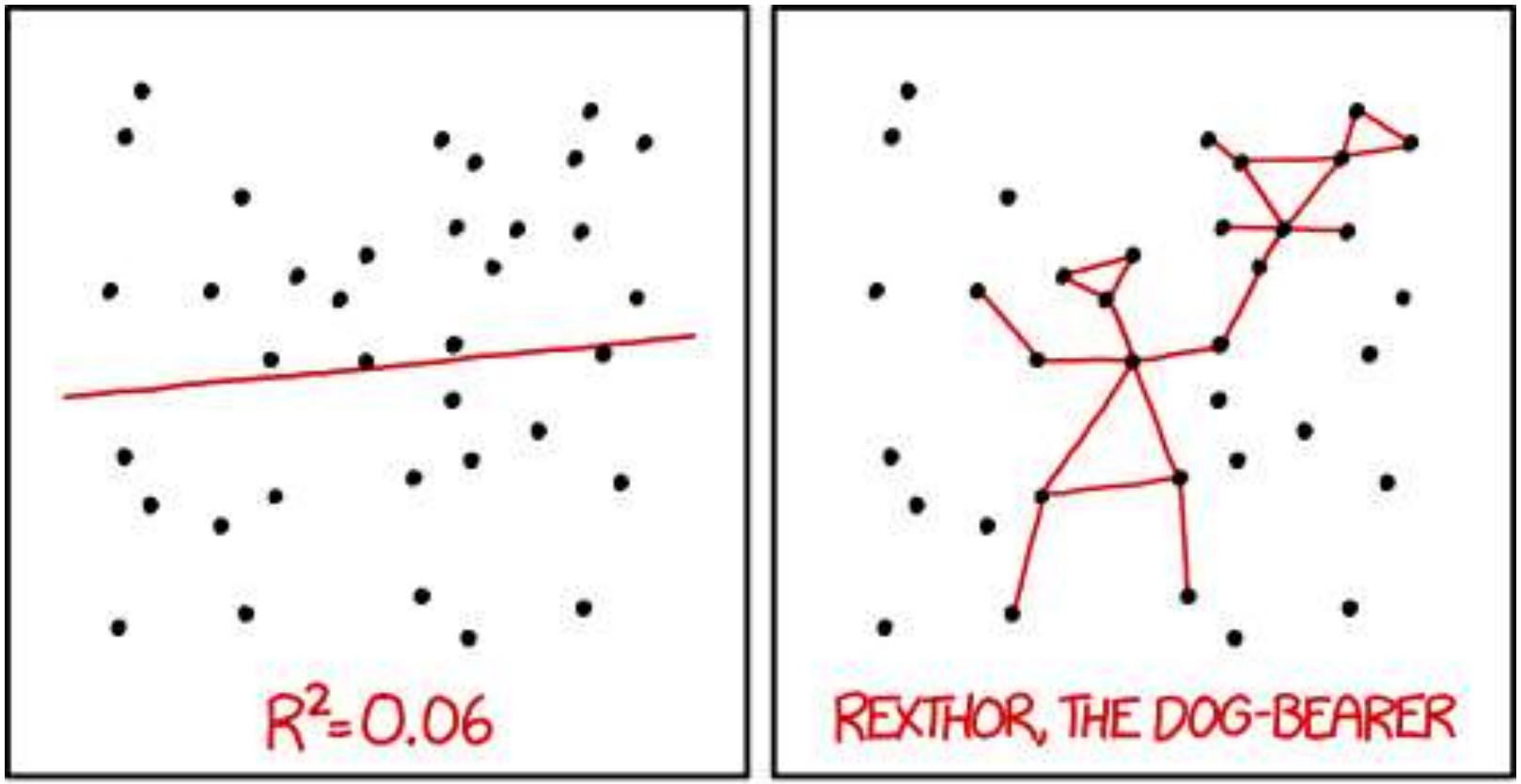
C. psittaci NL_Borg (G P)



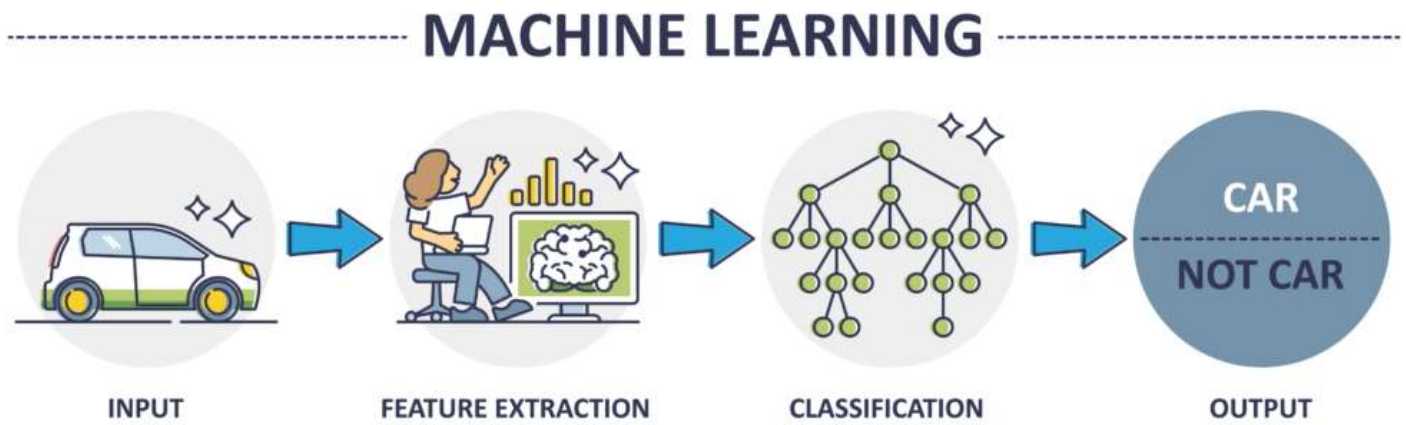


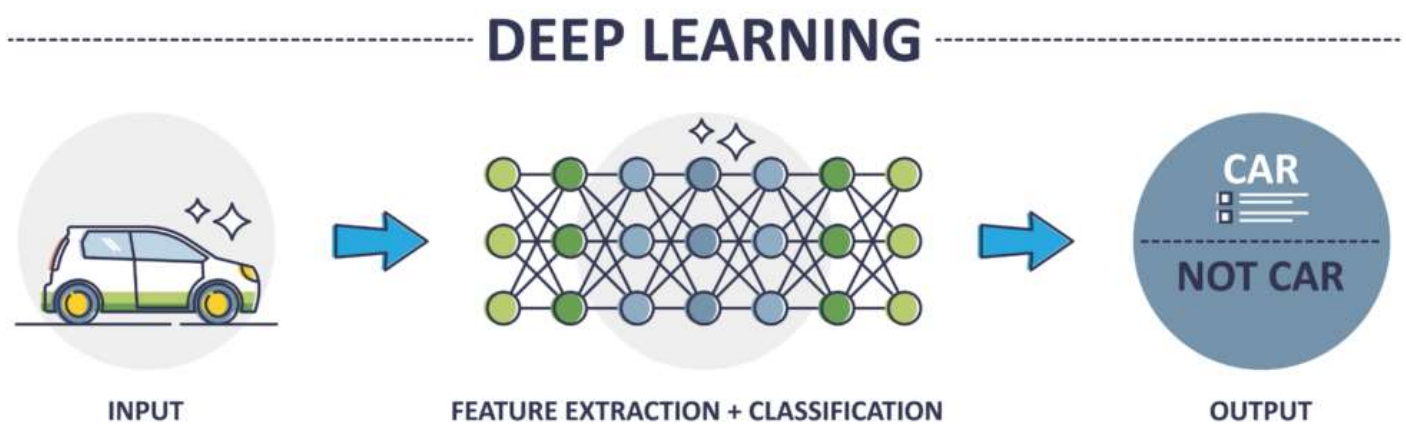


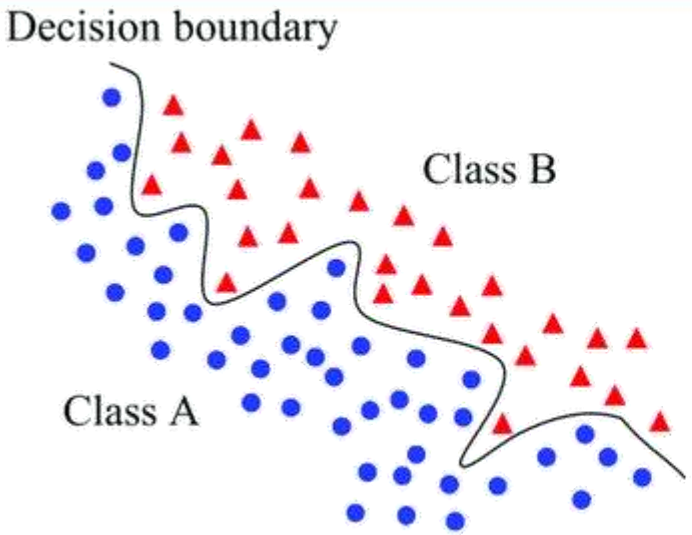

HOW LIFE IS SUPPOSED TO GO
START
END
HOW LIFE ACTUALLY GOES
START
END
ALYJUMA.COM



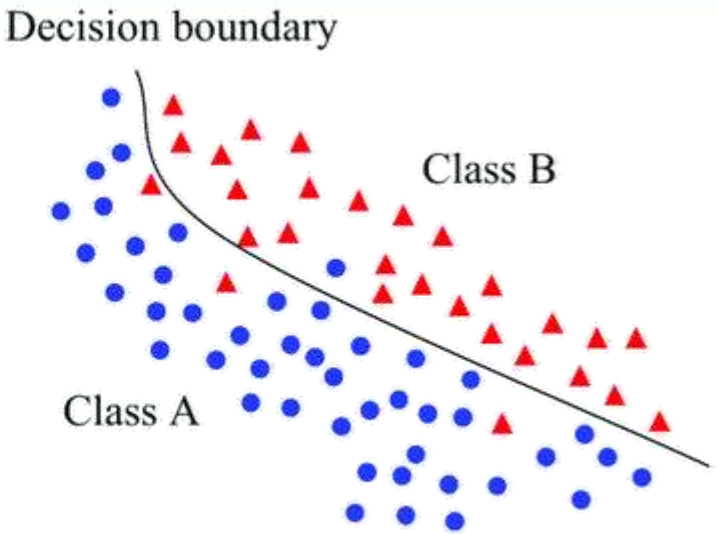
I DON'T TRUST LINEAR REGRESSIONS WHEN IT'S HARDER TO GUESS THE DIRECTION OF THE CORRELATION FROM THE SCATTER PLOT THAN TO FIND NEW CONSTELLATIONS ON IT.


MACHINE LEARNING
CAR
NOT CAR
INPUT
FEATURE EXTRACTION
CLASSIFICATION
OUTPUT


DEEP LEARNING
CAR
NOT CAR
INPUT
FEATURE EXTRACTION + CLASSIFICATION
OUTPUT

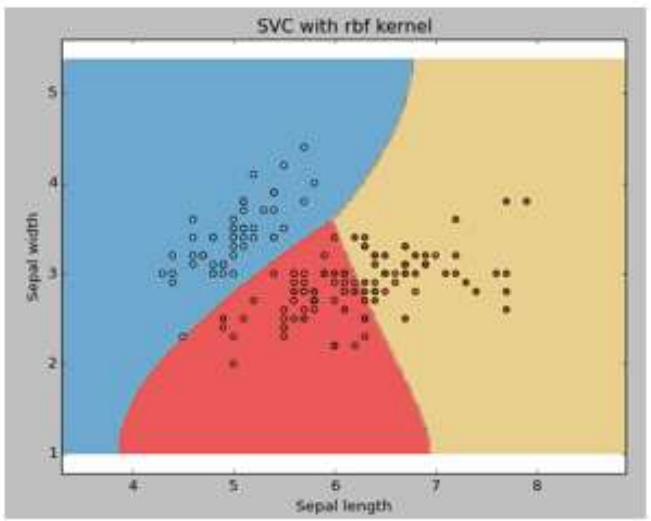


(a)

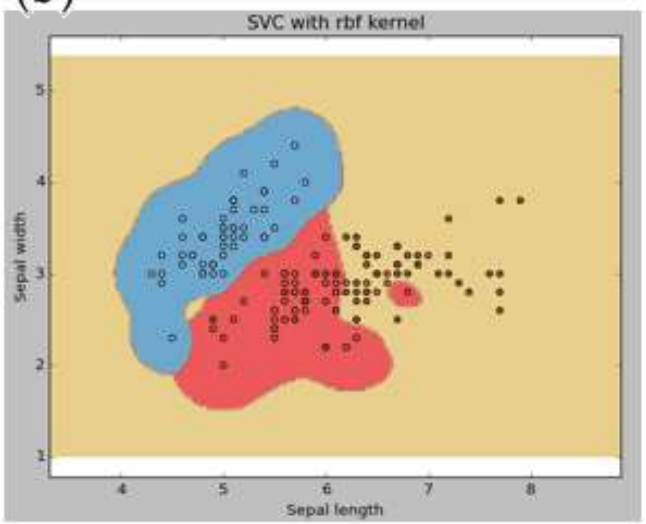


(b)

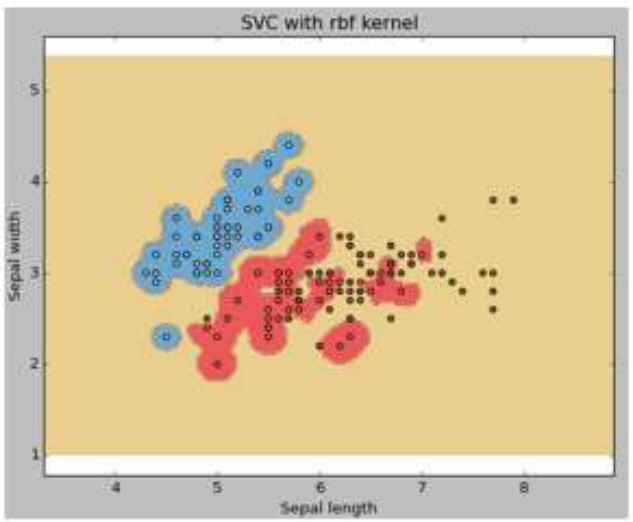
gamma =0

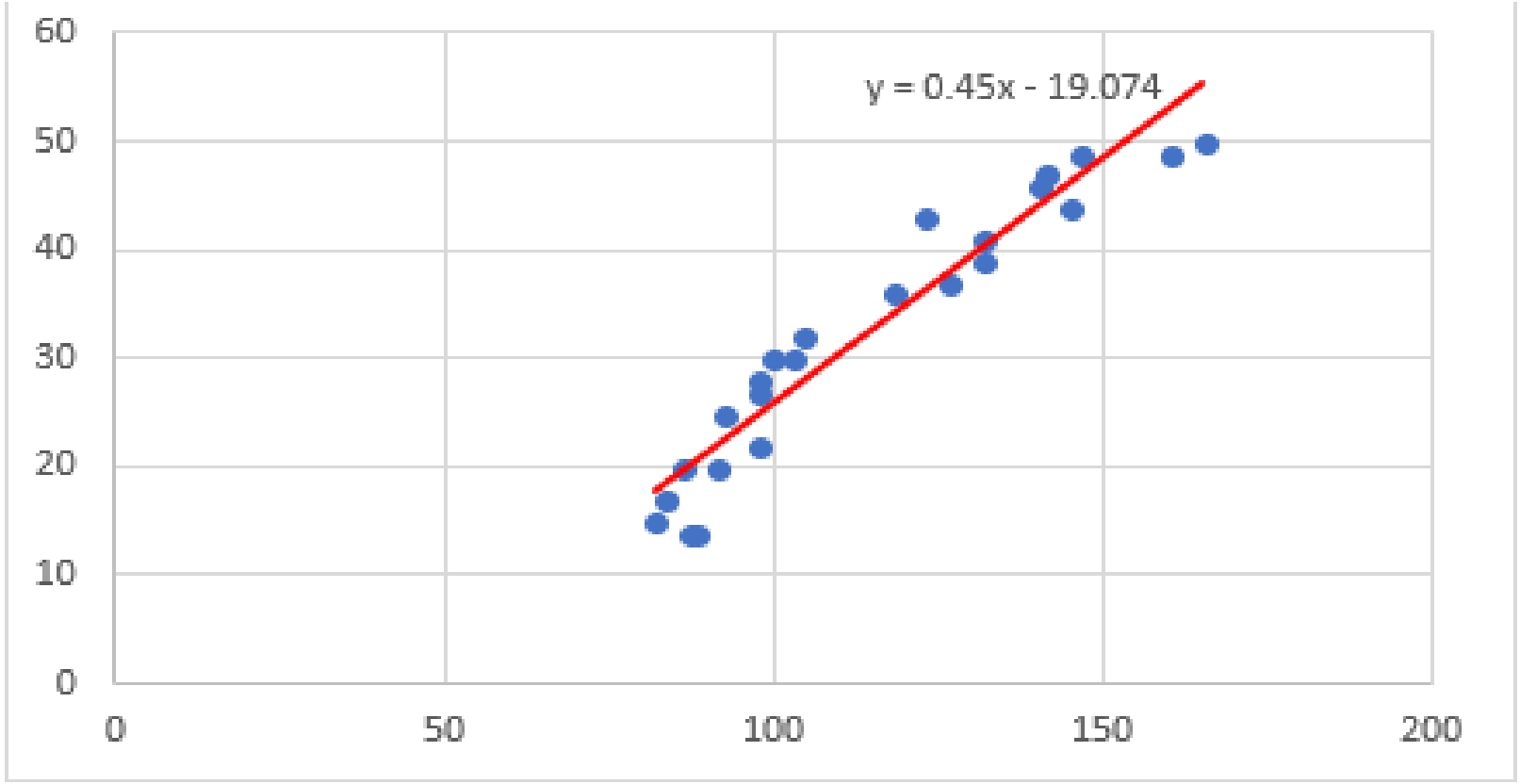


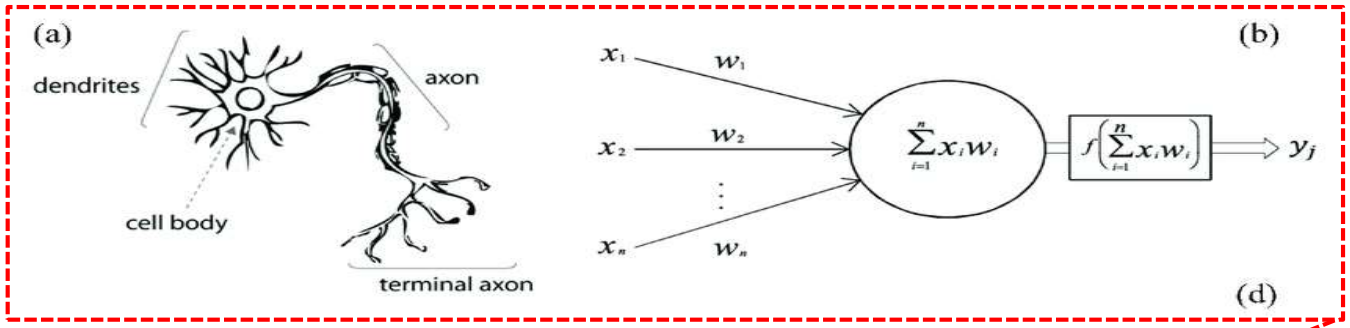
gamma =10

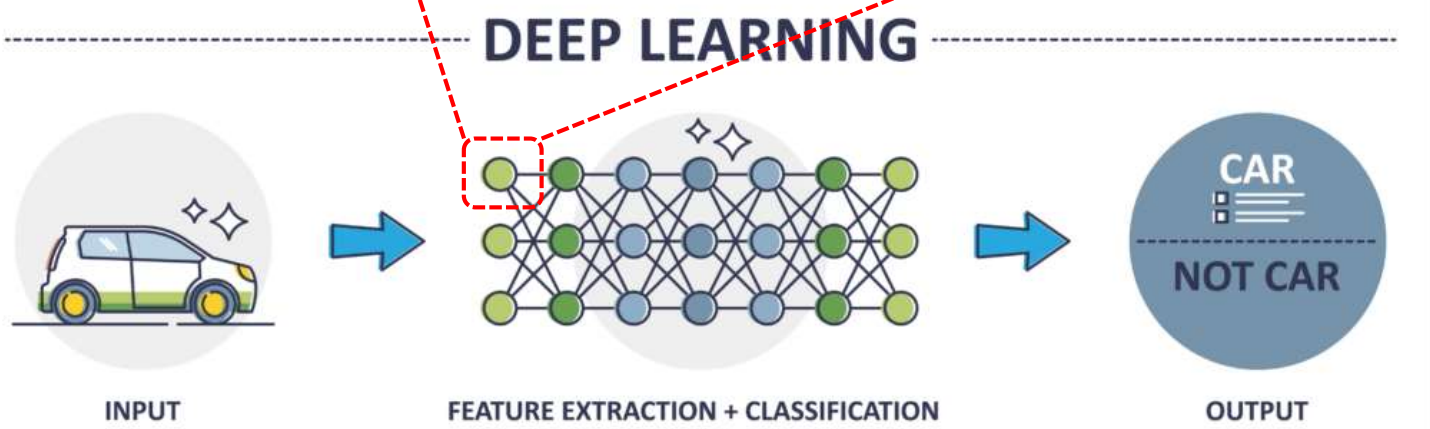


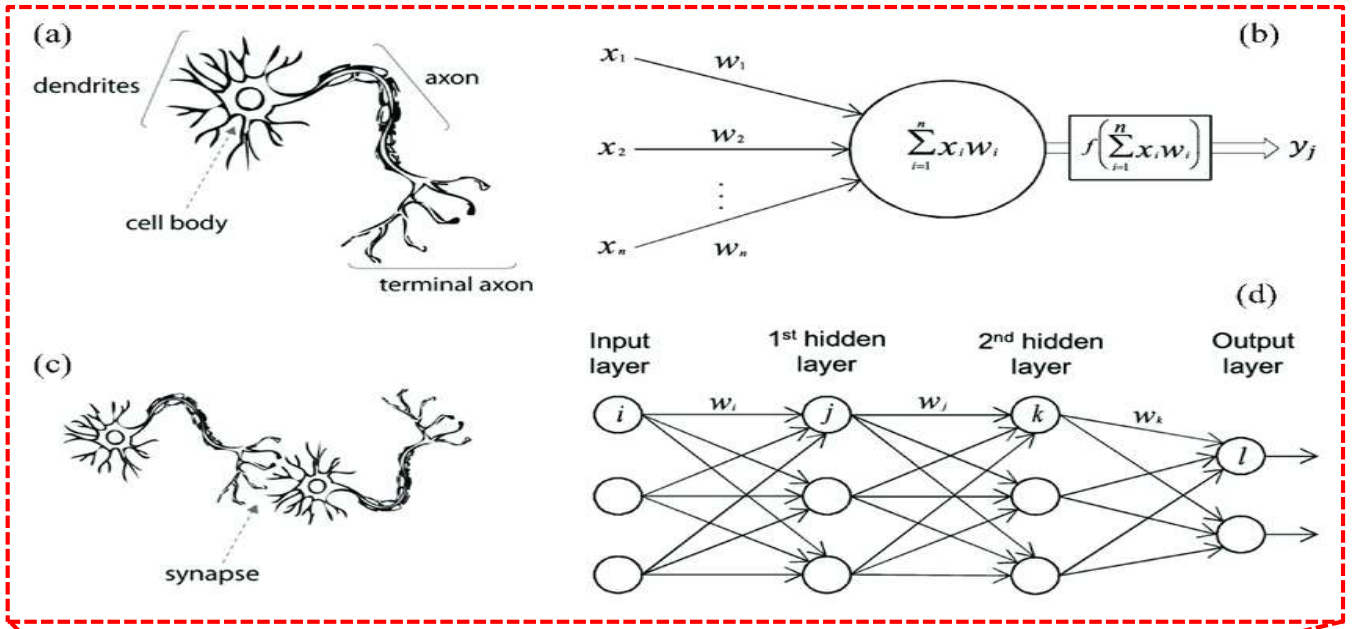
gamma =100



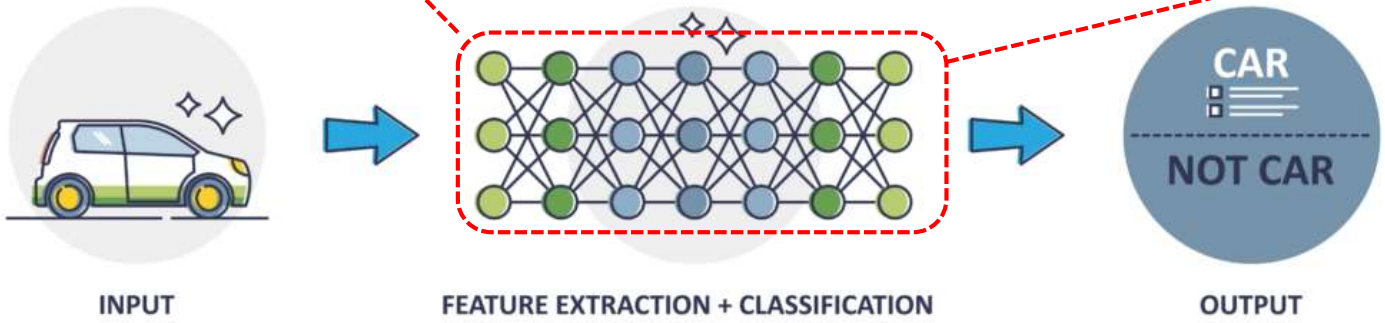

y = 0.45x - 19.074
60
50
40
30
20
10
0
0
50
100
150
200

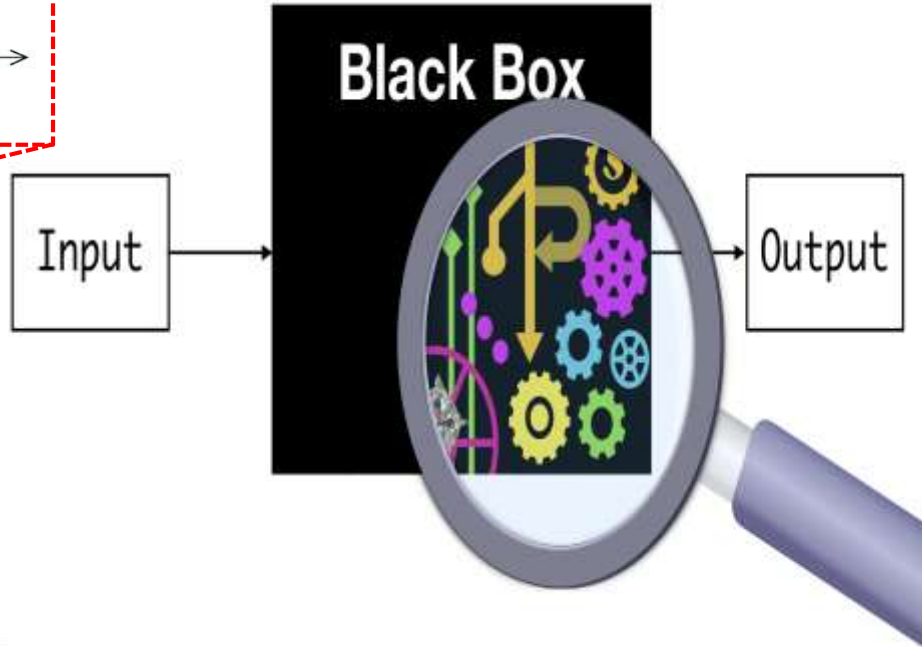

(a)
dendrites
axon
cell body
terminal axon
(b)
x_1
x_2
x_n
w_1
w_2
w_n
$\sum_{i=1}^{n} x_i w_i$
$f\left(\sum_{i=1}^{n} x_i w_i\right)$
y_j
(d)


DEEP LEARNING
CAR
NOT CAR
INPUT
FEATURE EXTRACTION + CLASSIFICATION
OUTPUT



DEEP LEARNING





MAPS

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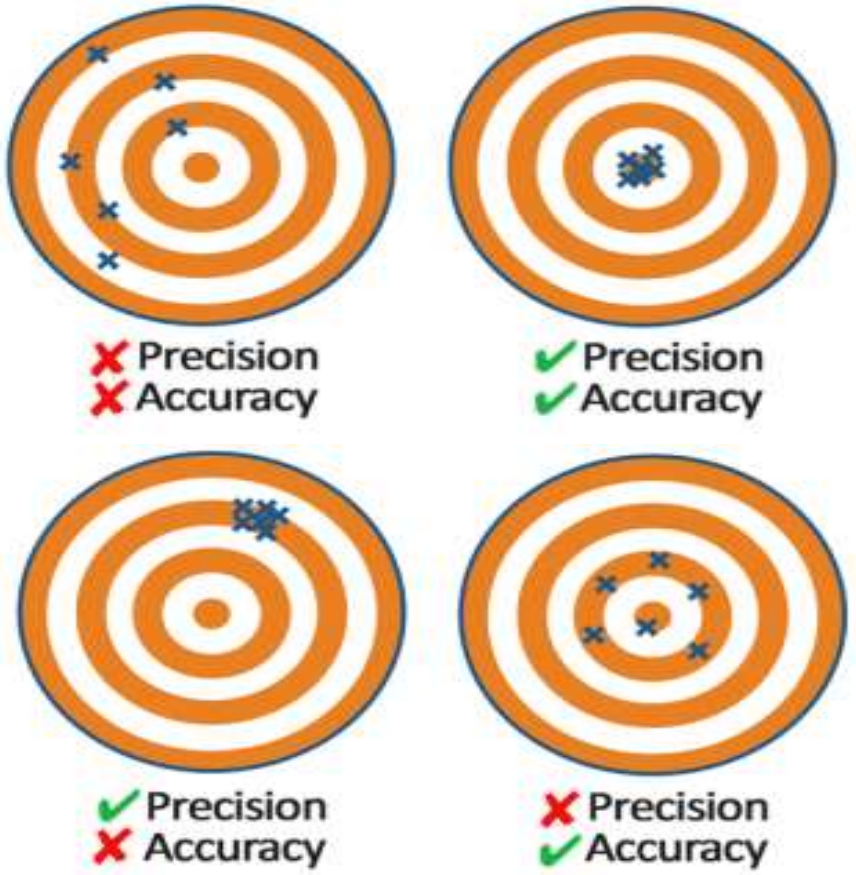
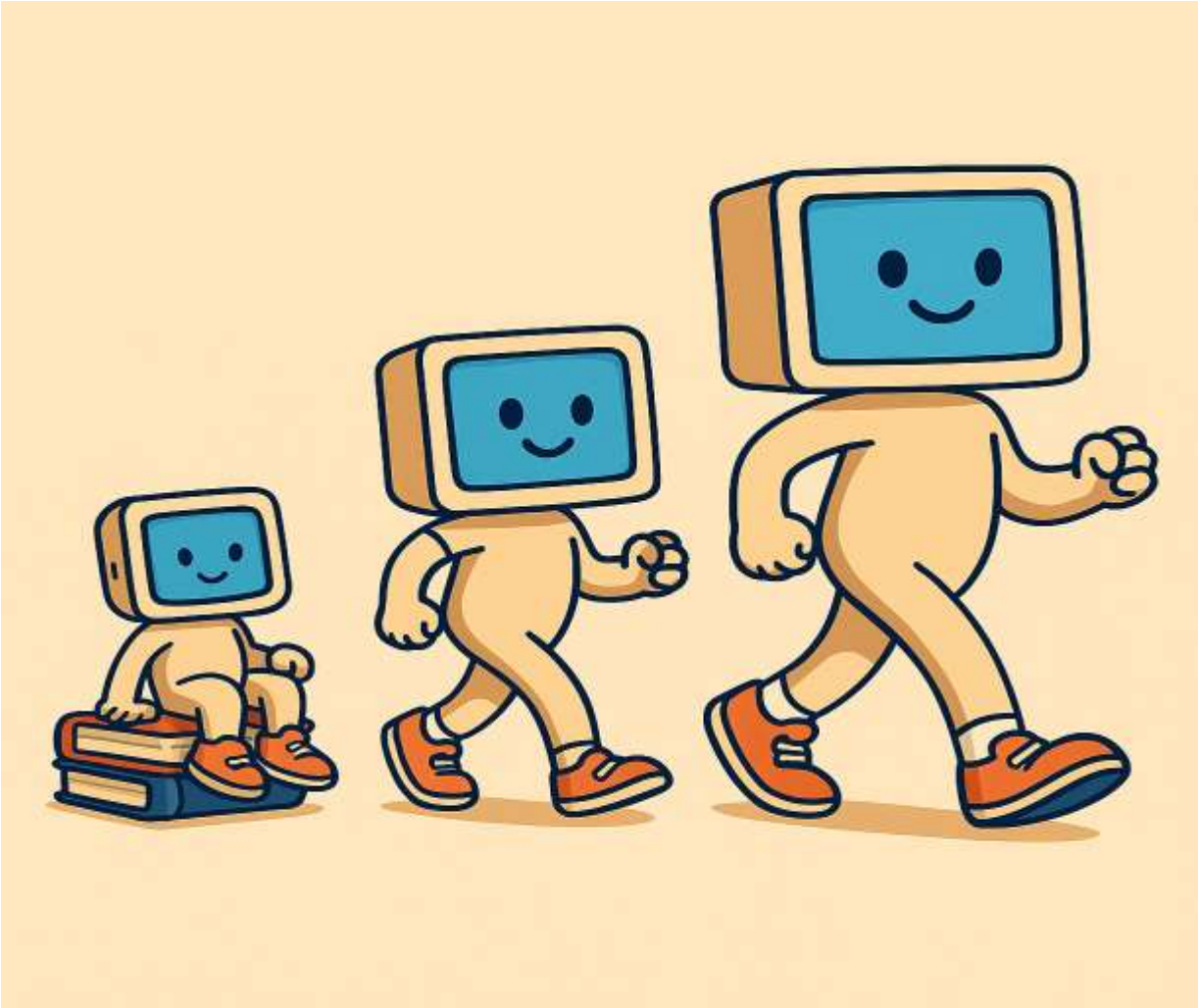
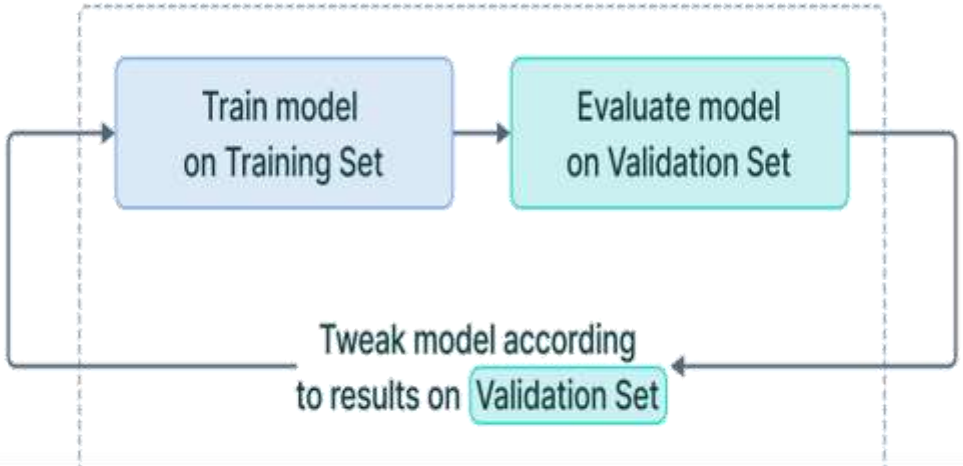

✗ Precision
✗ Accuracy
✓ Precision
✓ Accuracy
✓ Precision
✗ Accuracy
✗ Precision
✓ Accuracy



Independent Variables

Dependent Variable

Subject_ID	Age (years)	Weight (kg)	Systolic BP (mm Hg)
1	60	58	117
2	61	90	120
3	74	96	145
4	57	72	129
5	63	62	132
6	68	79	130
7	66	69	110
8	77	96	163
9	63	96	136
10	54	54	115
11	63	67	118
12	76	99	132
13	60	74	111
14	61	73	112
15	65	85	147
16	79	80	138



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1	60	58	117
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9	63	96	136
10	54	54	115
11	63	67	118
12	76	99	132
13	60	74	111
14	61	73	112
15	65	85	147
16	79	80	138

MAPS

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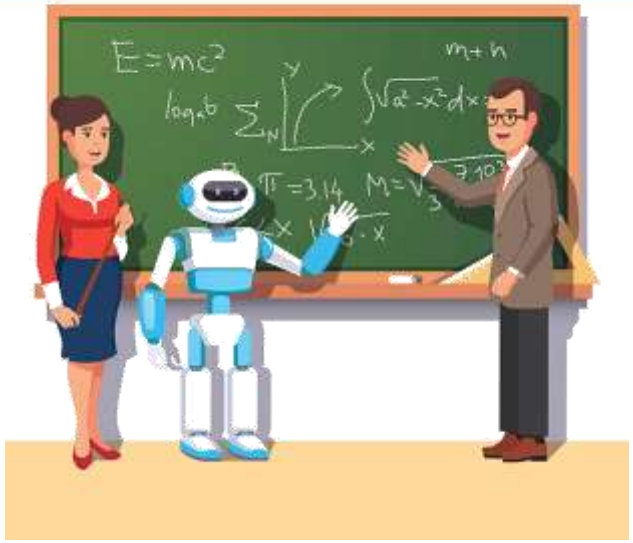
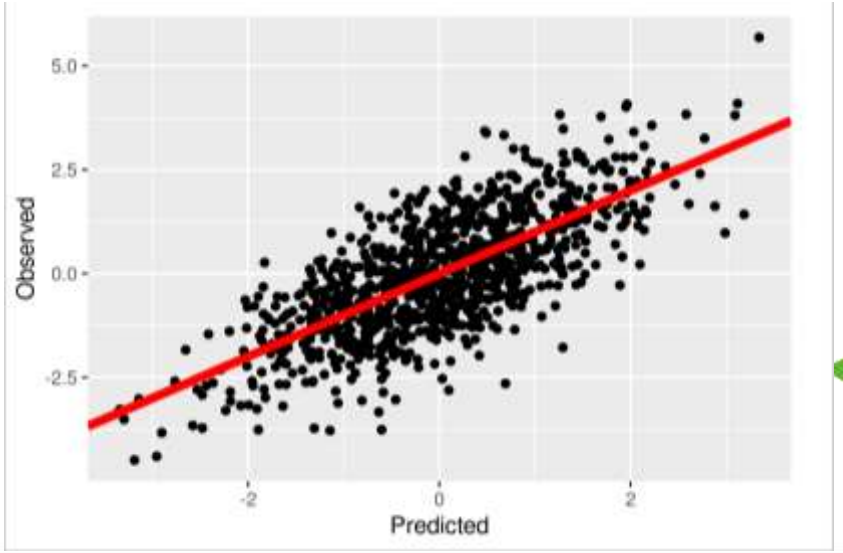


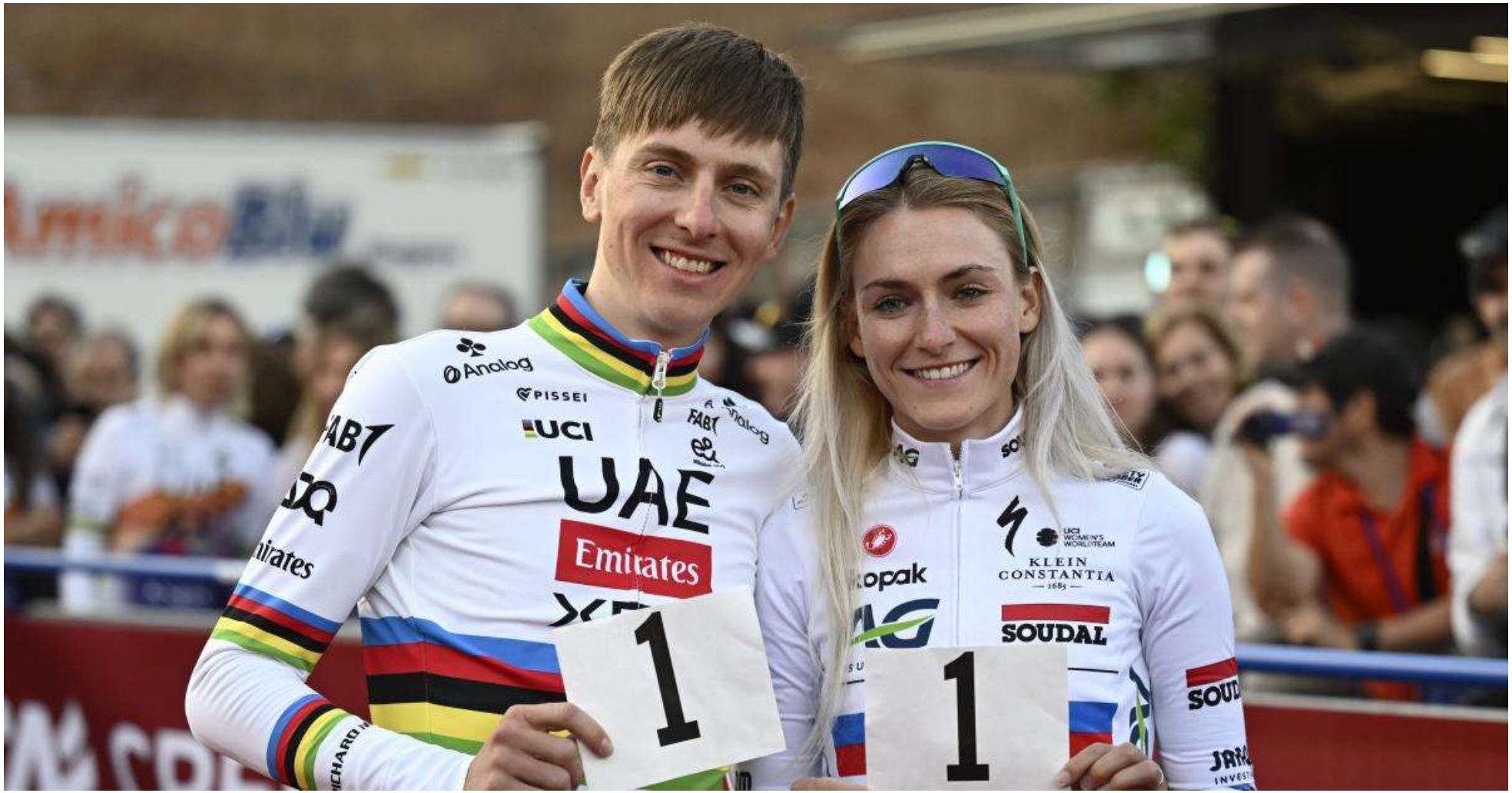
Independent Variables

Dependent Variable

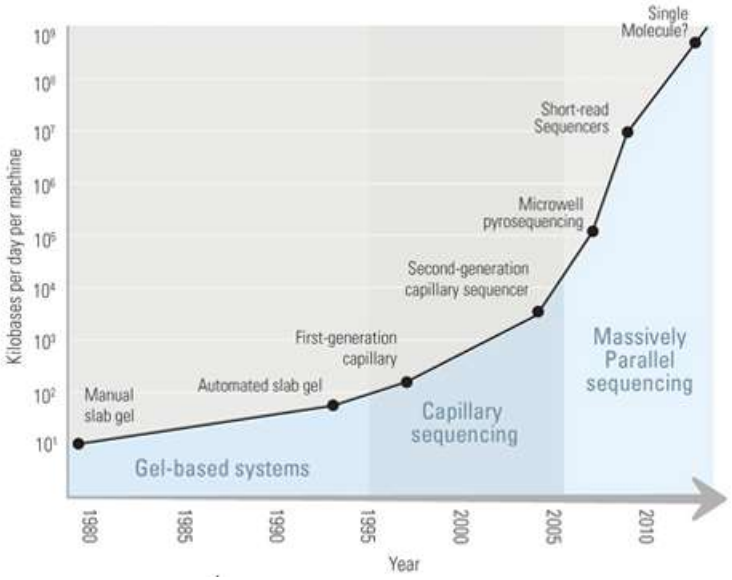
Subject_ID	Age (years)	Weight (kg)	Syste
1	60	58	
2	61	90	
3	74	96	
4	57	72	
5	63	62	
6	68	79	
7	66	69	
8	77	96	
9	63	96	
10	54	54	
11	63	67	
12	76	99	
13	60	74	
14	61	73	
15	65	85	
16	79	80	

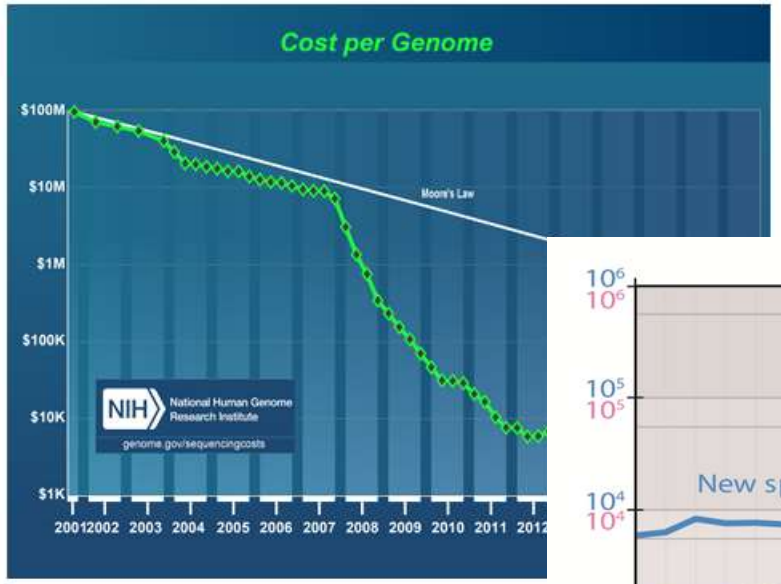


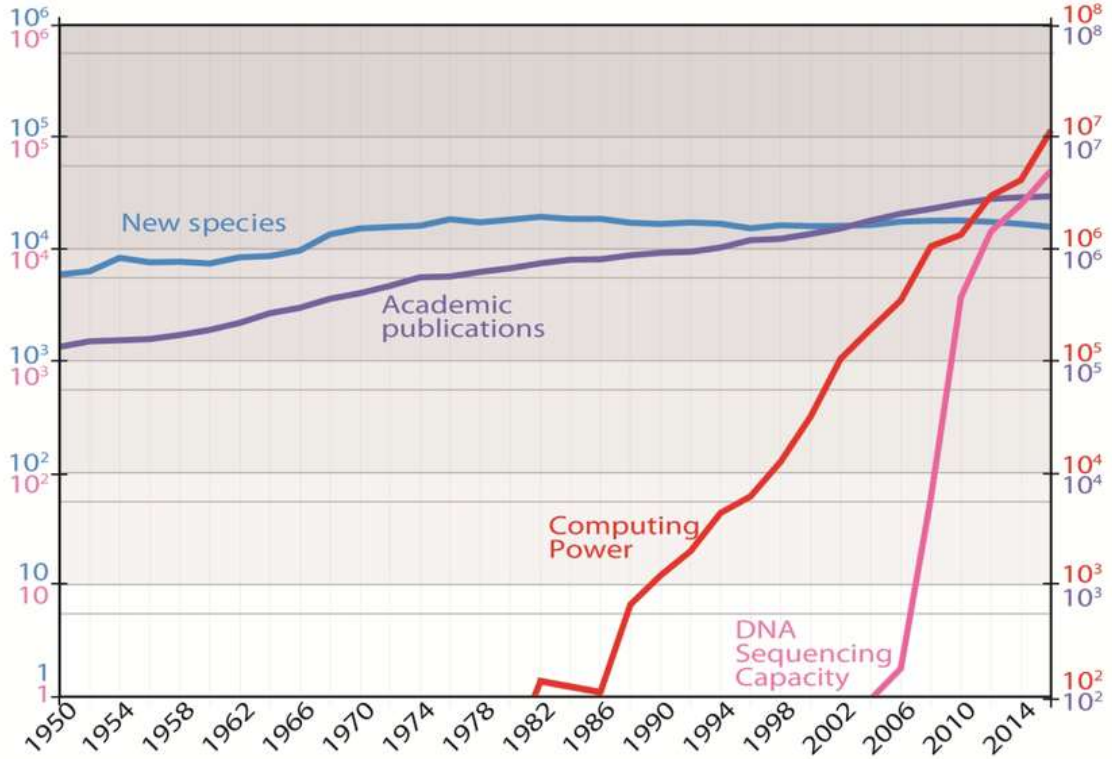

What Is DNA?
Everything You Need To Know

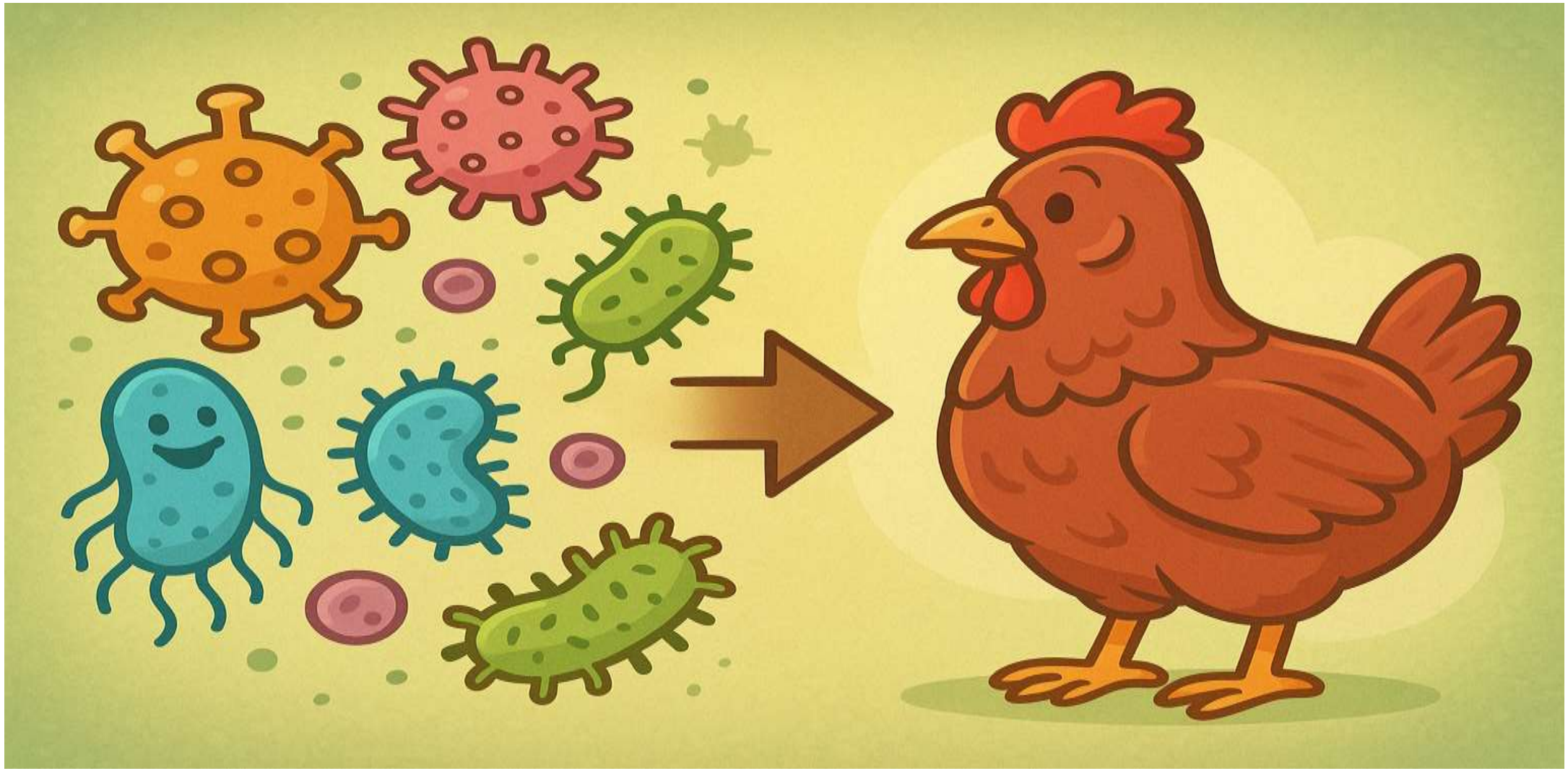

Analog
PISSEI
UCI
UAE
Emirates
1
KLEIN CONSTANTIA
SOUDAL
1

IMPROVEMENTS IN THE RATE OF DNA SEQUENCING









MAPS

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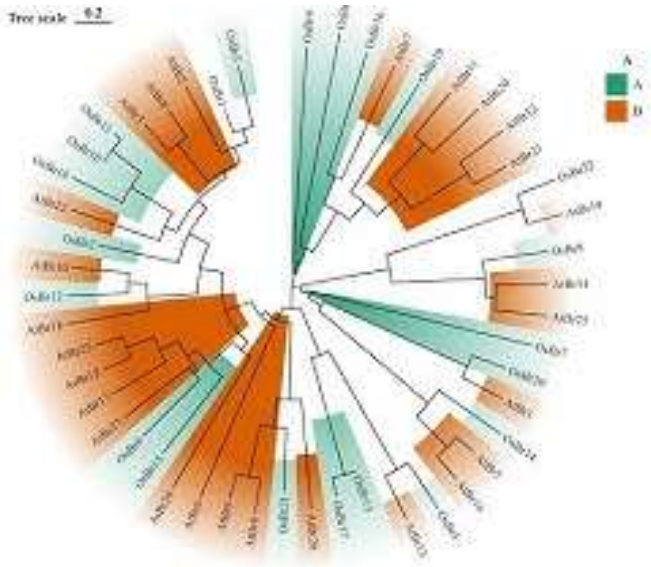

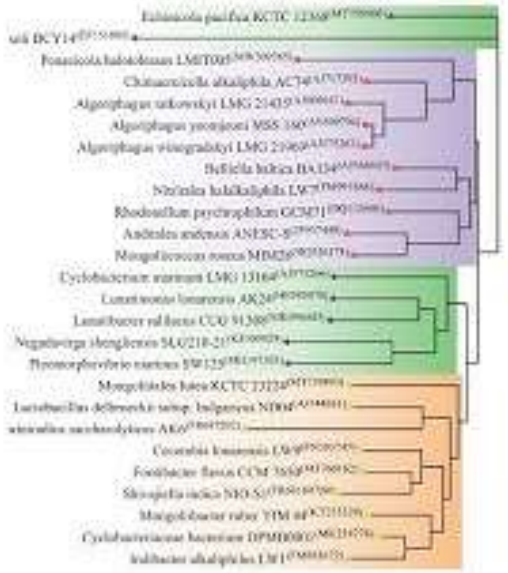

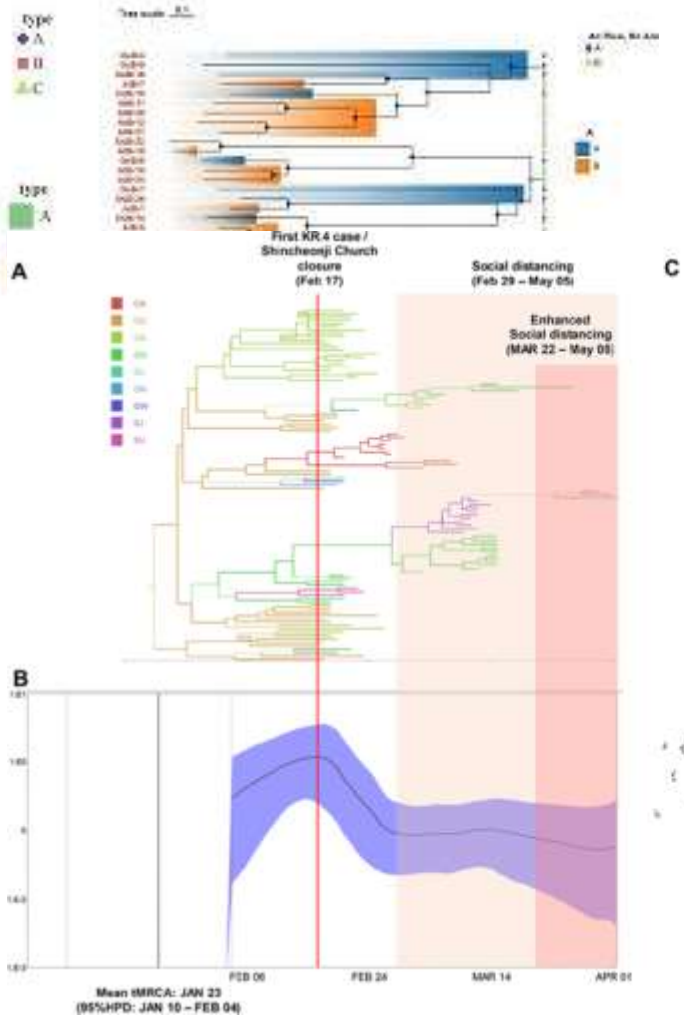

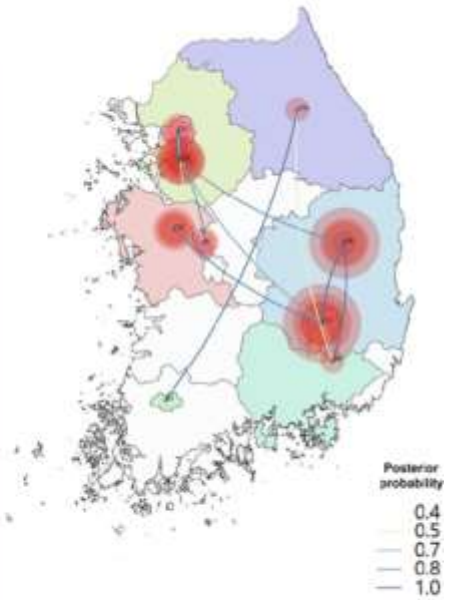

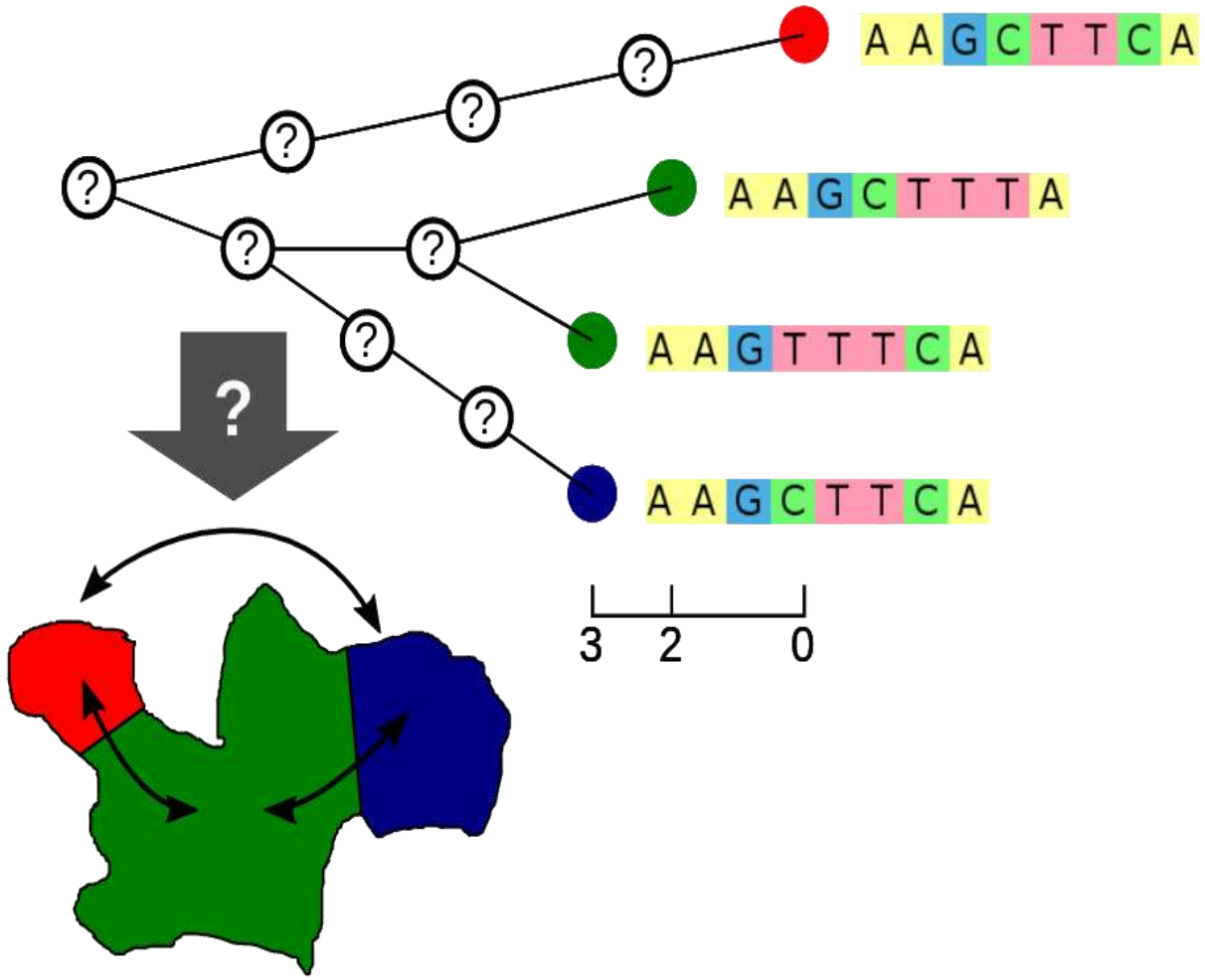
A A G C T T C A
A A G C T T T A
A A G T T T C A
A A G C T T C A
?
3 2 0

MAPS

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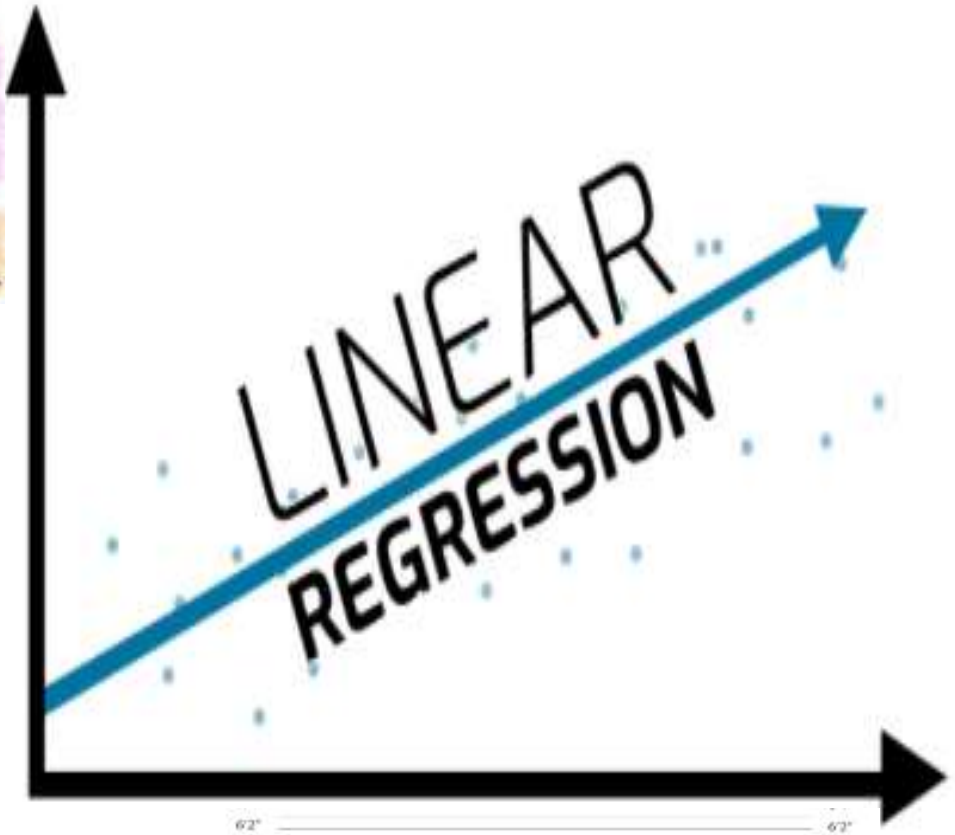

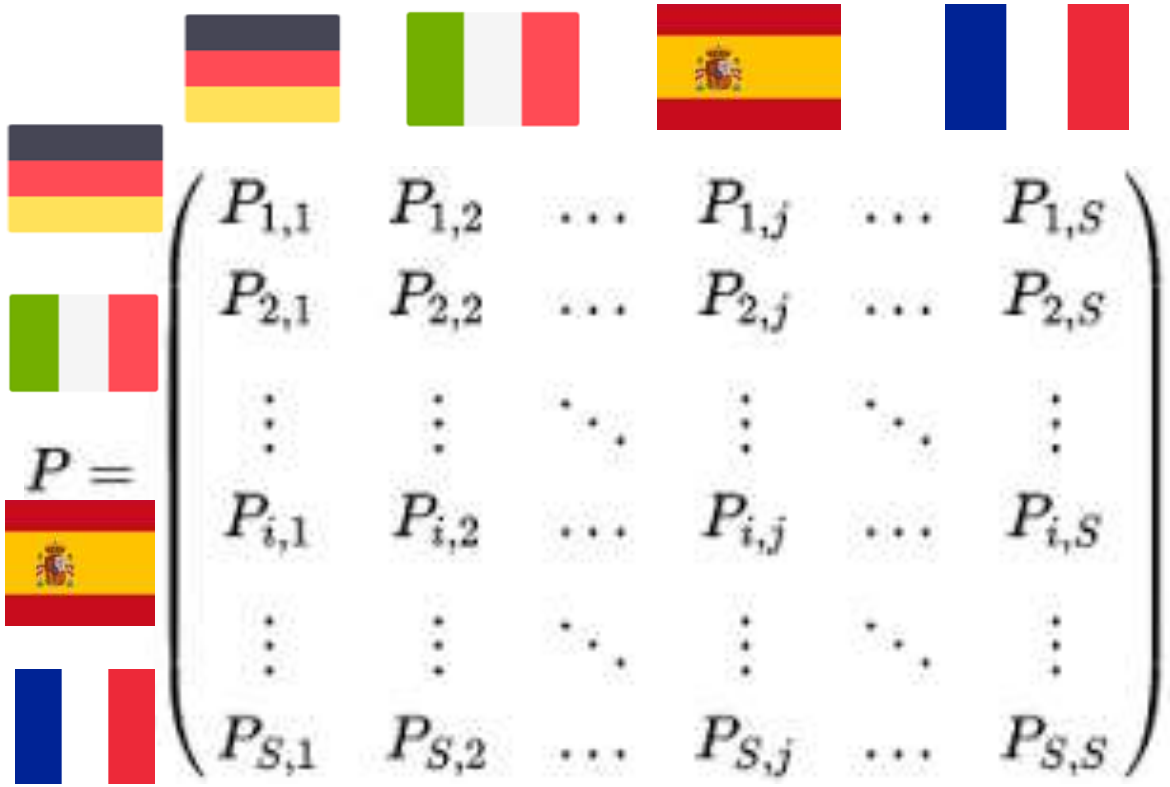

$$P = \begin{pmatrix} P_{1,1} & P_{1,2} & \dots & P_{1,j} & \dots & P_{1,S} \\ P_{2,1} & P_{2,2} & \dots & P_{2,j} & \dots & P_{2,S} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ P_{i,1} & P_{i,2} & \dots & P_{i,j} & \dots & P_{i,S} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ P_{S,1} & P_{S,2} & \dots & P_{S,j} & \dots & P_{S,S} \end{pmatrix}$$

MAPS

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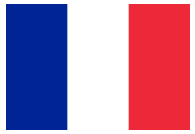
$$\log(\Lambda_{ij}) \rightleftharpoons \sum_{p=1}^{P} \beta_p \delta_p \chi_{ijp}$$

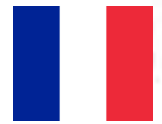






$$P = \begin{pmatrix} P_{1,1} & P_{1,2} & \dots & P_{1,j} & \dots & P_{1,S} \\ P_{2,1} & P_{2,2} & \dots & P_{2,j} & \dots & P_{2,S} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ P_{i,1} & P_{i,2} & \dots & P_{i,j} & \dots & P_{i,S} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ P_{S,1} & P_{S,2} & \dots & P_{S,j} & \dots & P_{S,S} \end{pmatrix}$$





$$\log \Lambda_{ij} = \log(p_1) \times \beta_1 \times \delta_1 + \log(p_2) \times \beta_2 \times \delta_2 + \cdots + \log(p_n) \times \beta_n \times \delta_n$$

MAPS

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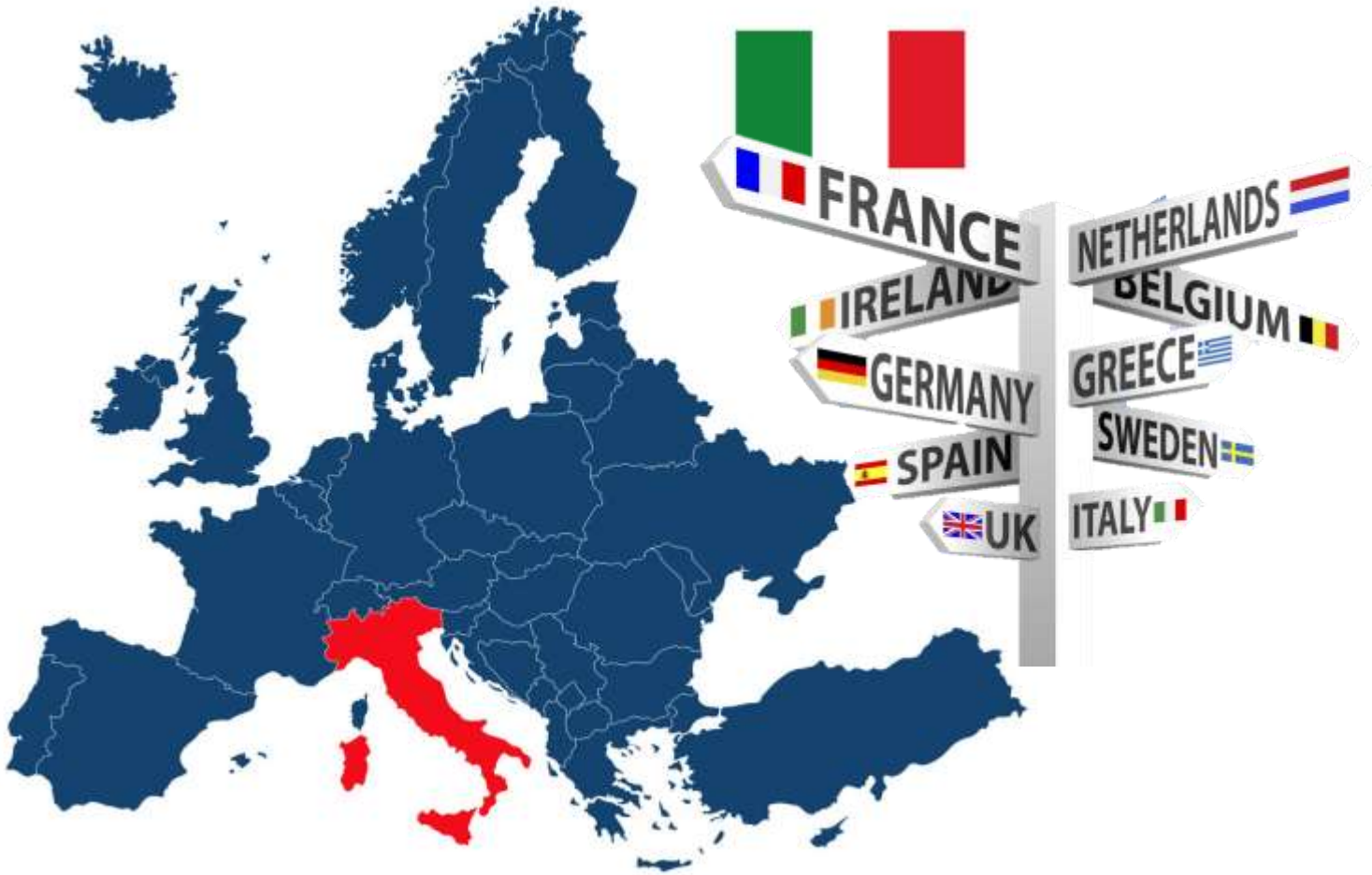
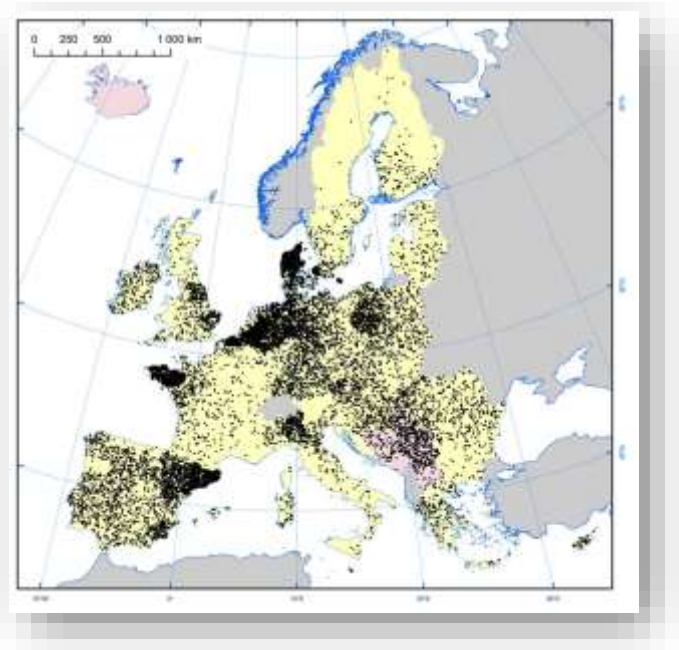


SPRING CHICKEN

Travel

$$\log \Lambda_{ij} = \log(p_1) \times \beta_1 \times \delta_1 + \log(p_2) \times \beta_2 \times \delta_2 + \cdots + \log(p_n) \times \beta_n \times \delta_n$$

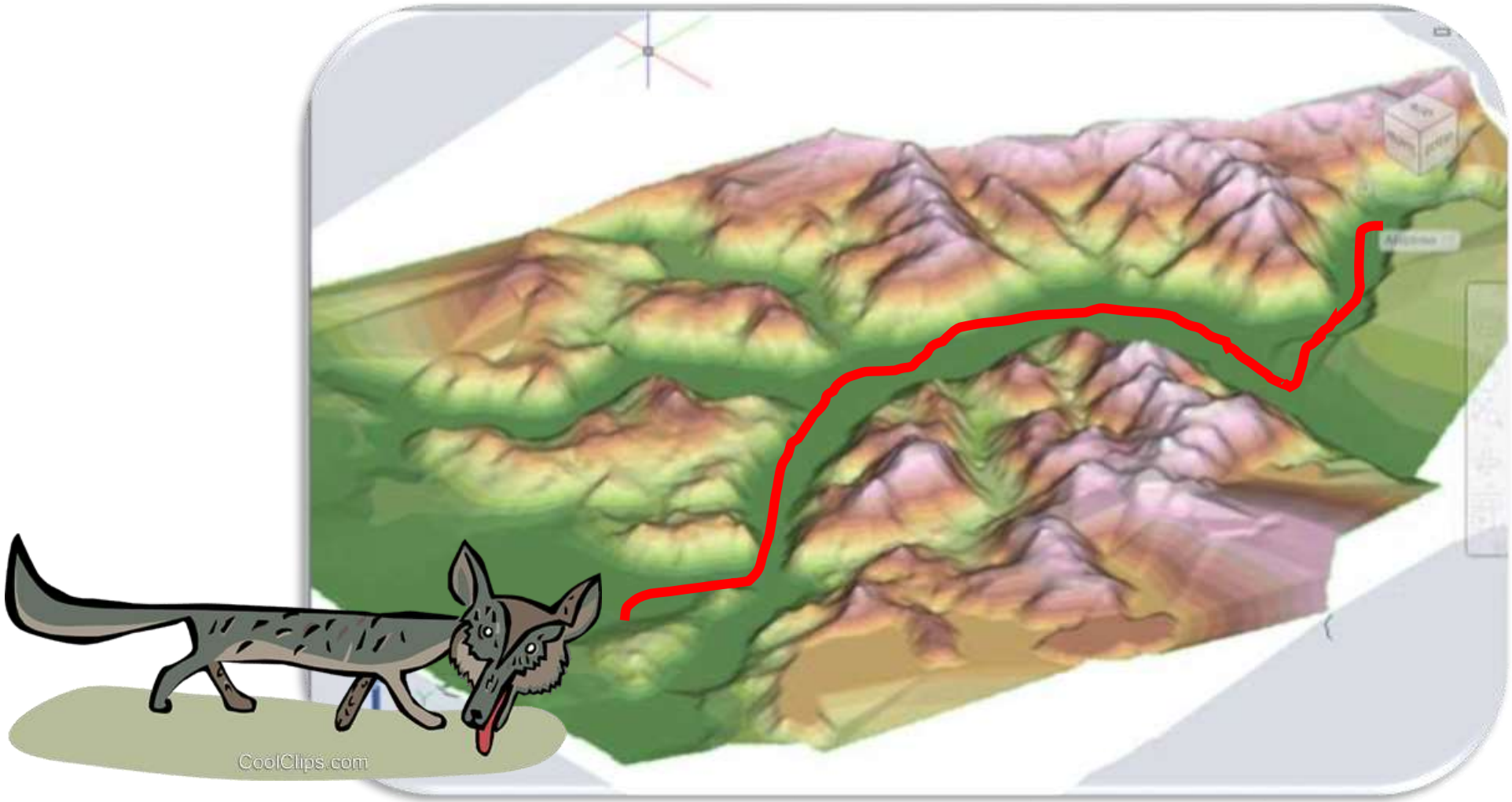
Commerci



Densità animale

Investimenti in agricoltura

Livello di formazione degli addetti del settore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nature research

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Phylodynamic analysis and evaluation of the balance between anthropic and environmental factors affecting IBV spreading among Italian poultry farms

Giovanni Franzo[1]✉, Claudia Maria Tucciarone[1], Ana Moreno[2], Matteo Legnardi[1], Paola Massi[3], Giovanni Tosi[3], Tiziana Trogu[2], Raffaella Ceruti[4], Patrizia Pesente[5], Giovanni Ortali[5], Luigi Gavazzi[4] & Mattia Cecchinato[1]

MAPS

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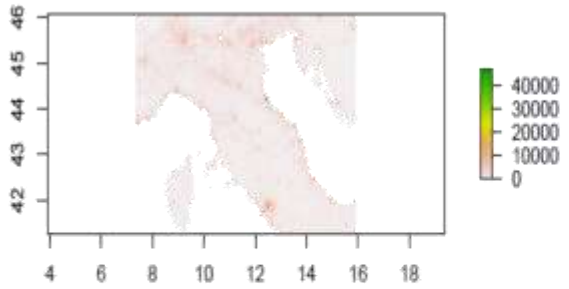
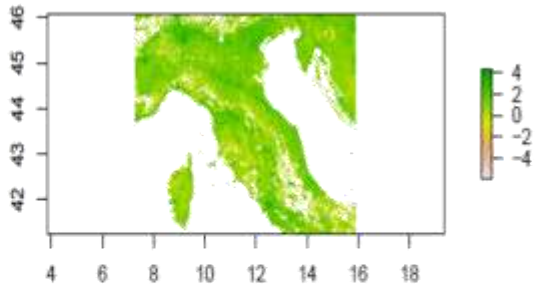
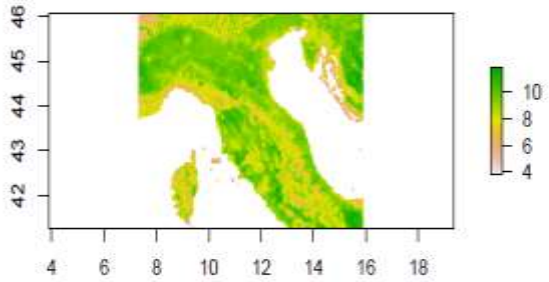
Street density



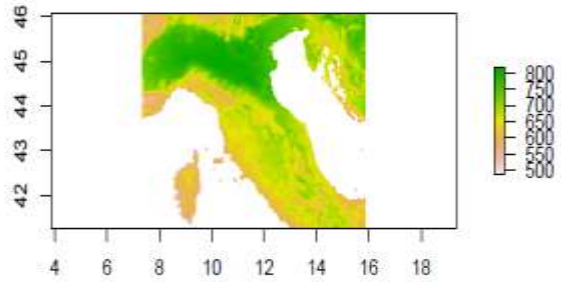
Human population density (log10)



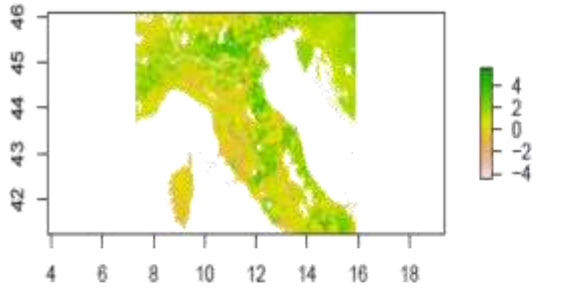
Mean Diurnal Range



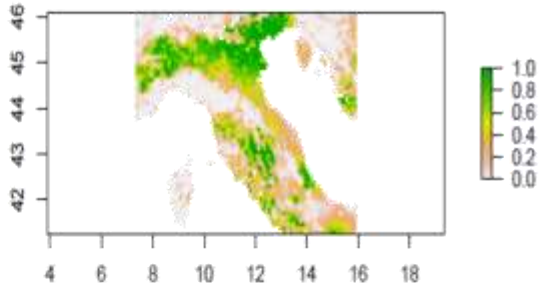
Temperature Seasonality



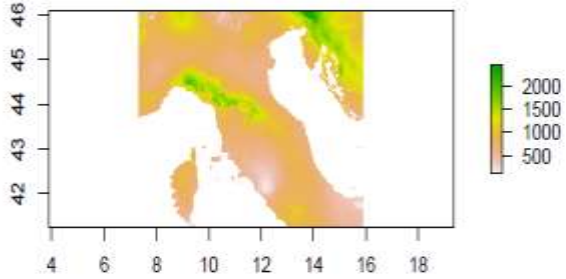
Chicken population density (log10)



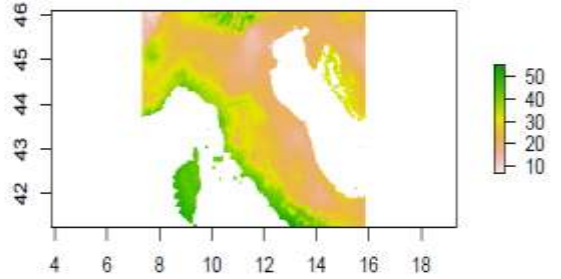
Cropland



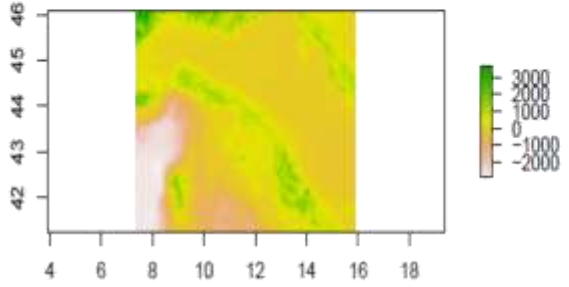
Annual Precipitation



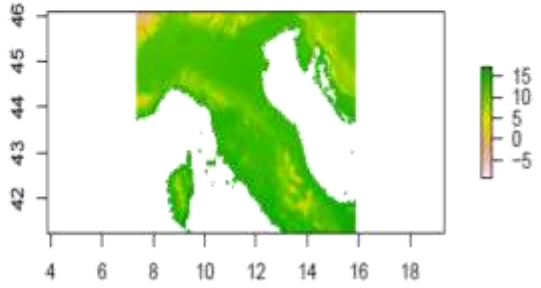
Precipitation Seasonality



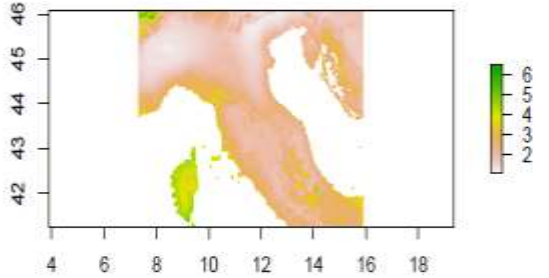
Elevation



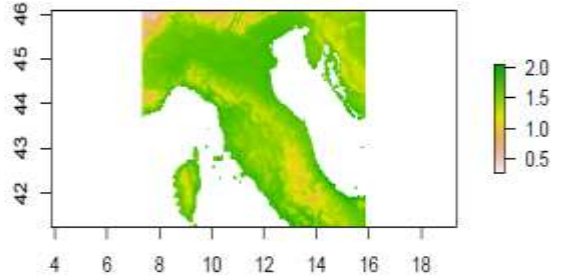
Annual Mean Temperature

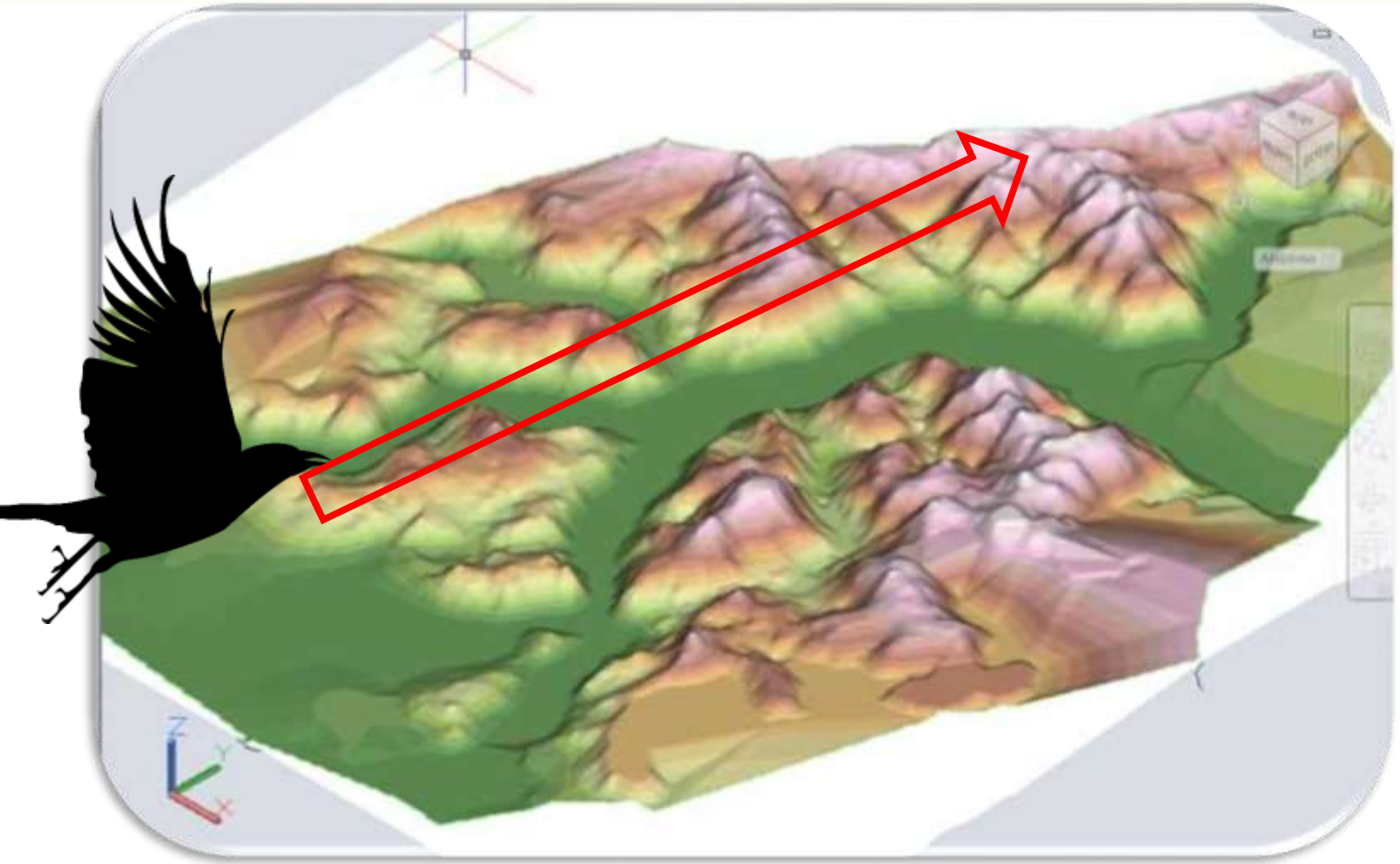


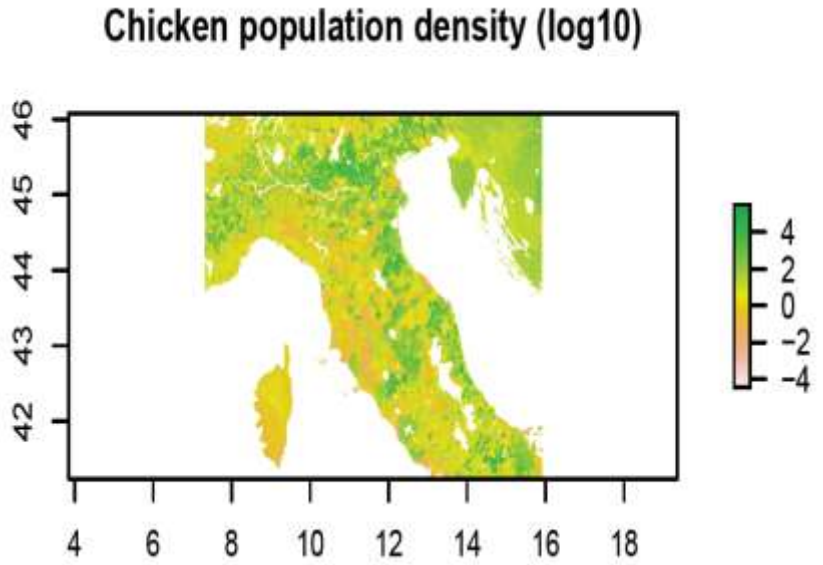
Wind speed (m/s)

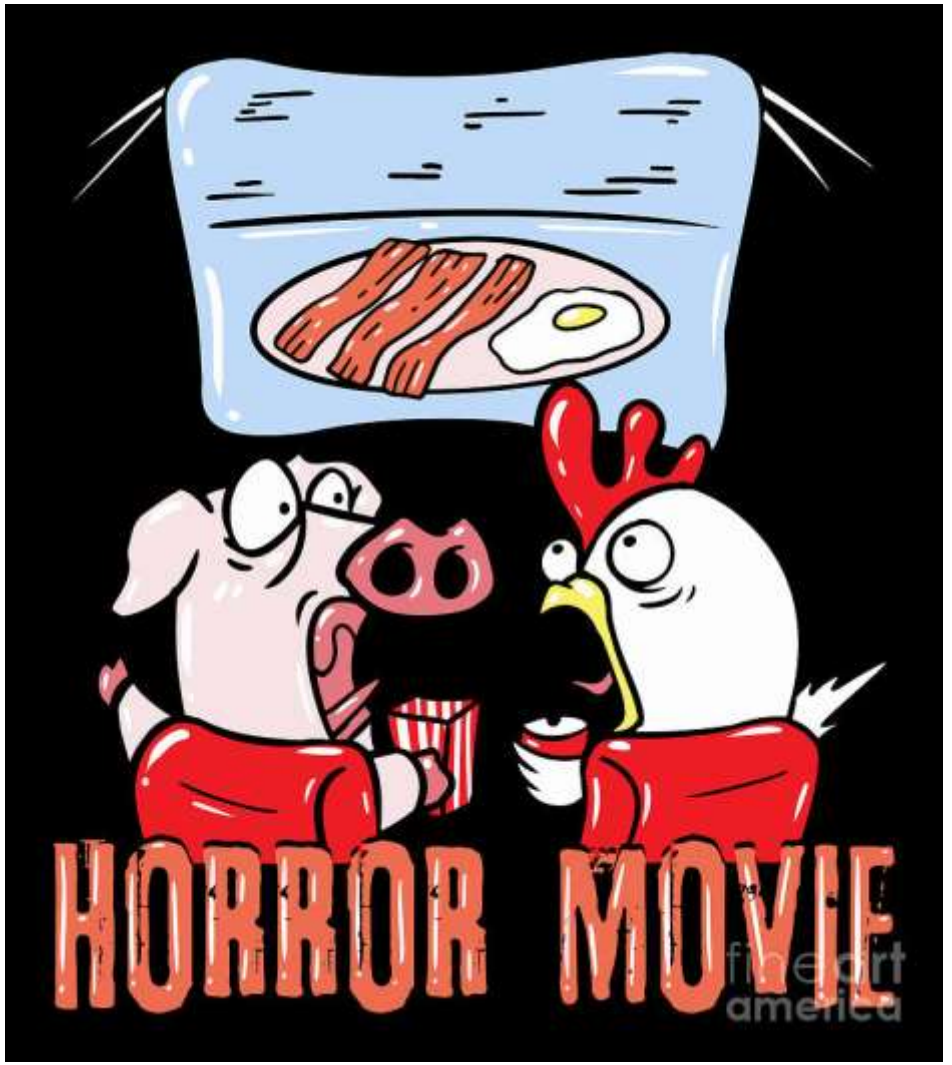


Water vapor pressure (kPa)






Chicken population density (log10)
46
45
44
43
42
4
6
8
10
12
14
16
18
4
2
0
−2
−4


HORROR MOVIE

MAPS

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MAPS

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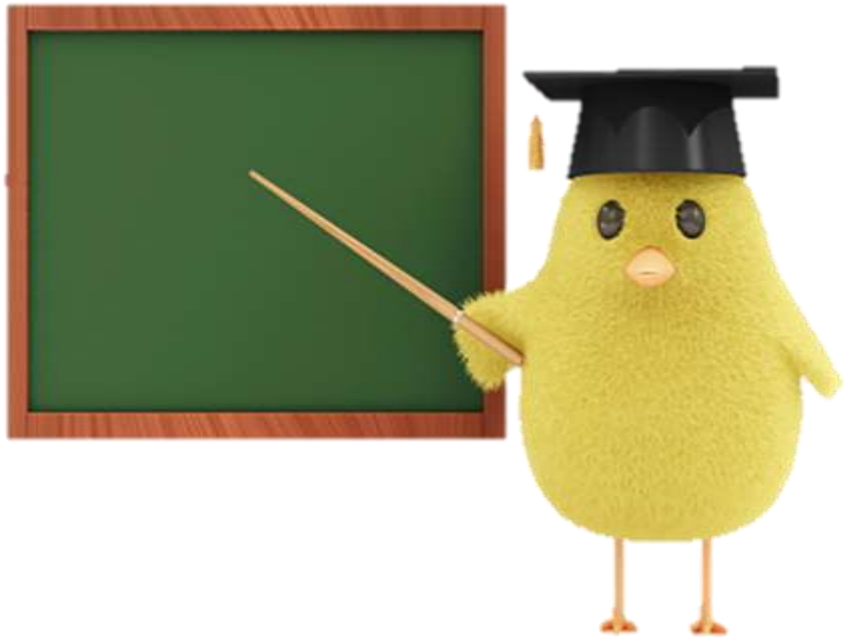


Franzo et al. Vet Res (2019) 50:92
https://doi.org/10.1186/s13567-019-0713-4

VETERINARY RESEARCH

RESEARCH ARTICLE Open Access

Evolution of infectious bronchitis virus in the field after homologous vaccination introduction

Giovanni Franzo*†, Matteo Legnardi†, Claudia Maria Tucciarone, Michele Drigo, Marco Martini and Mattia Cecchinato

2012-2017

QX (GI-19)

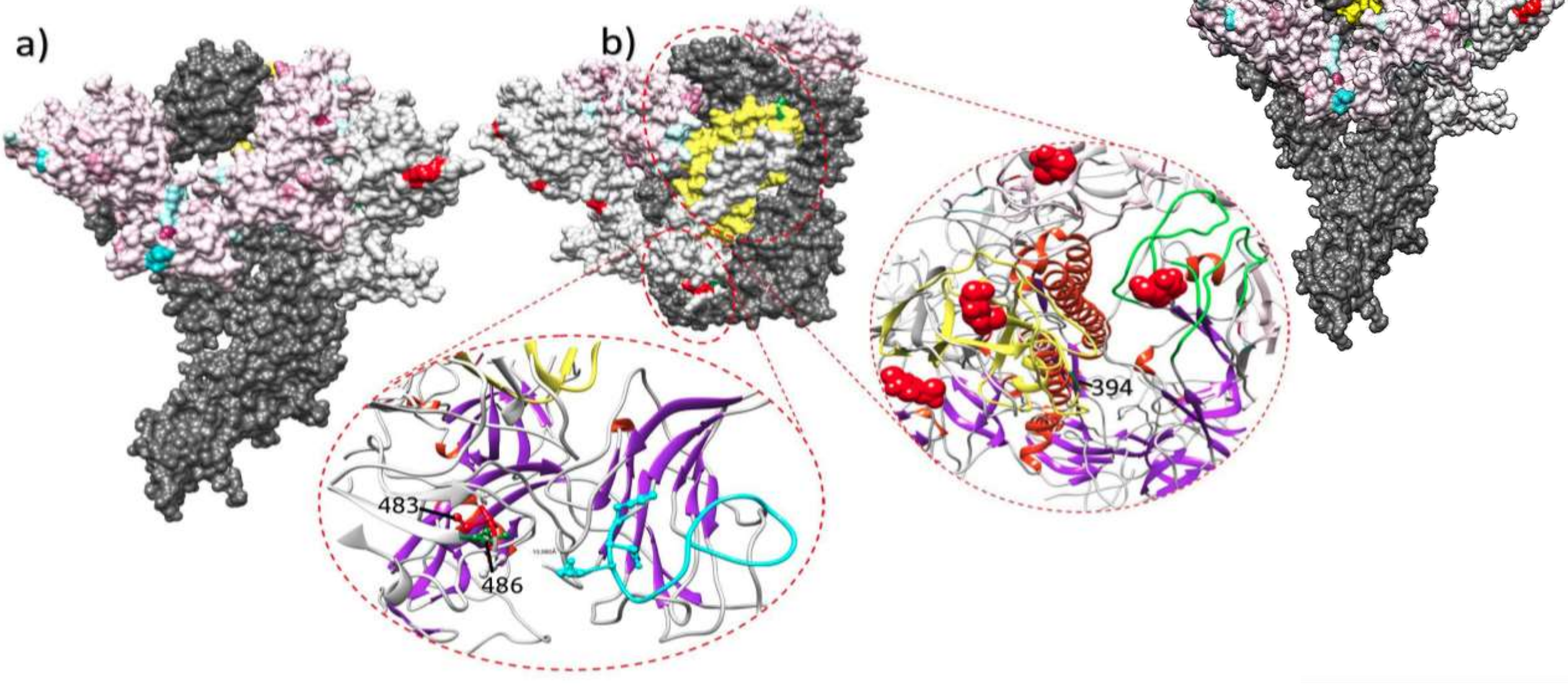
Mass

793B

Mass

QX

2012 2015 2017


a)
b)
483
486
394

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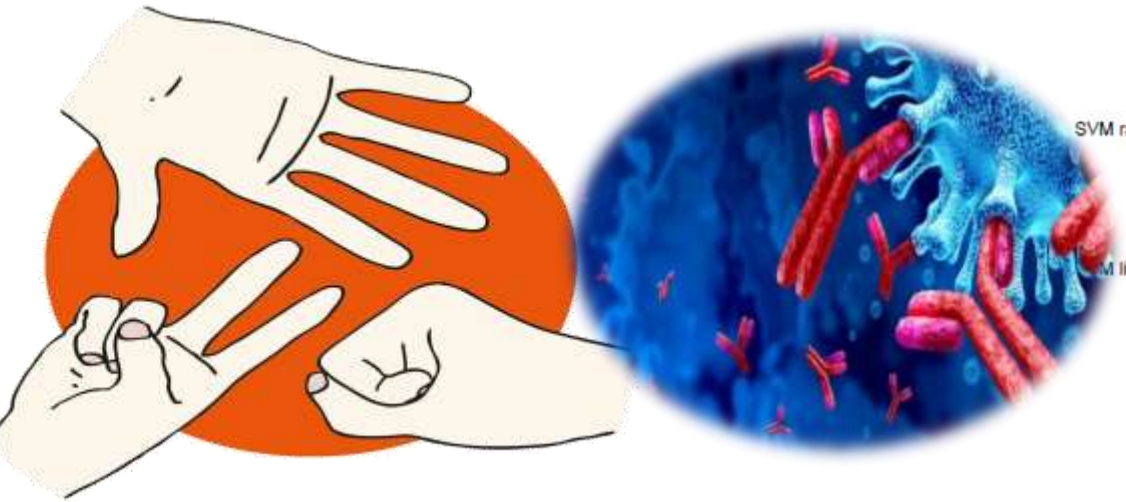
viruses

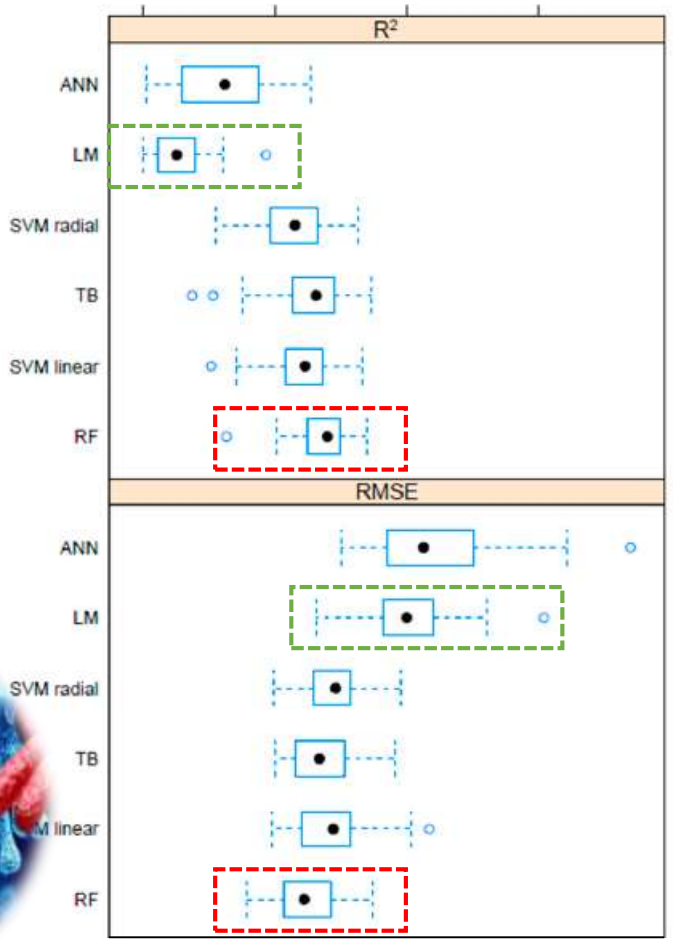
MDPI

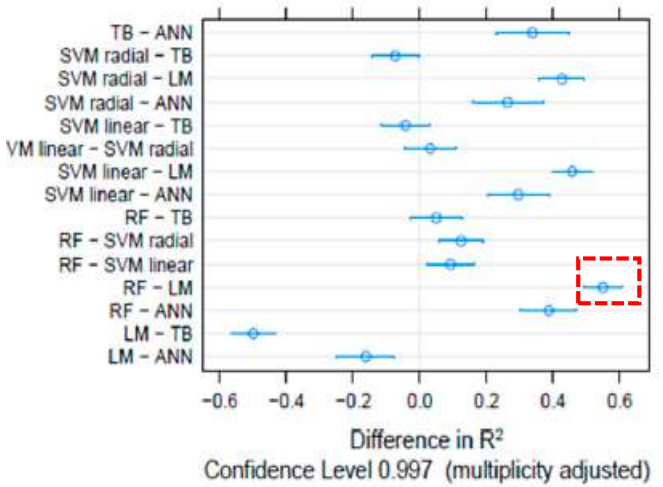
Article

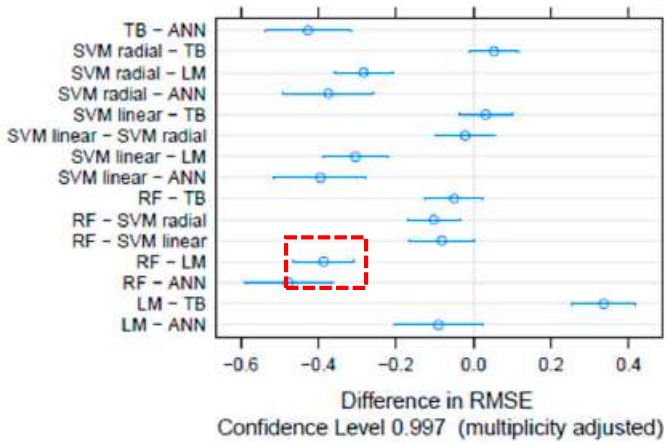
Evaluation of Different Machine Learning Approaches to Predict Antigenic Distance Among Newcastle Disease Virus (NDV) Strains

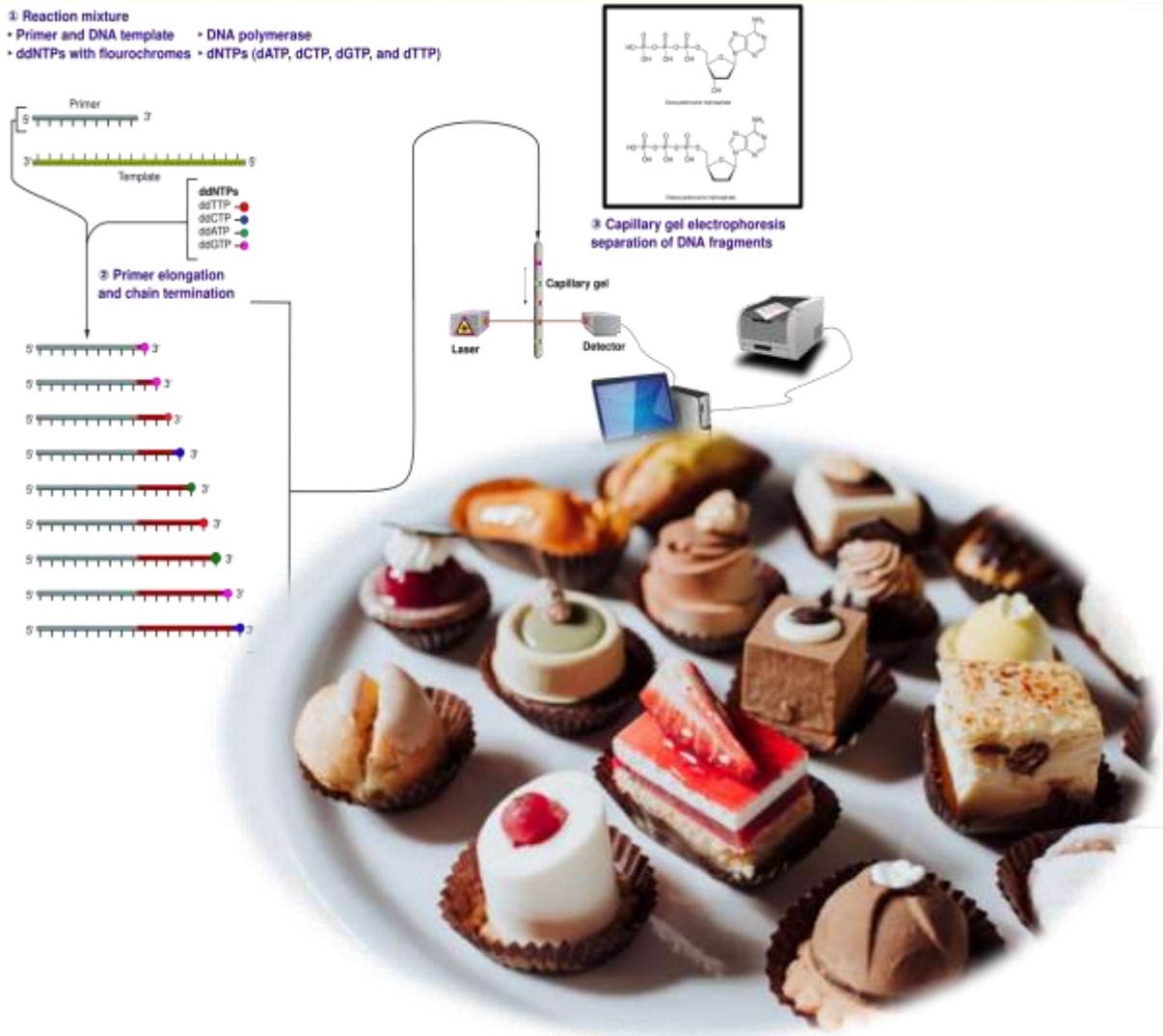
Giovanni Franzo [1,*], Alice Fusaro [2], Chantal J. Snoeck [3], Aleksandar Dodovski [4], Steven Van Borm [5], Mieke Steensels [5], Vasiliki Christodoulou [6], Iuliana Onita [7], Raluca Burlacu [7], Azucena Sánchez Sánchez [8], Ilya A. Chvala [9], Mia Kim Torchetti [10], Ismaila Shittu [11], Mayowa Olabode [11], Ambra Pastori [2], Alessia Schivo [2], Angela Salomoni [2], Silvia Maniero [2], Ilaria Zambon [2], Francesco Bonfante [2], Isabella Monne [2], Mattia Cecchinato [1] and Alessio Bortolami [2]









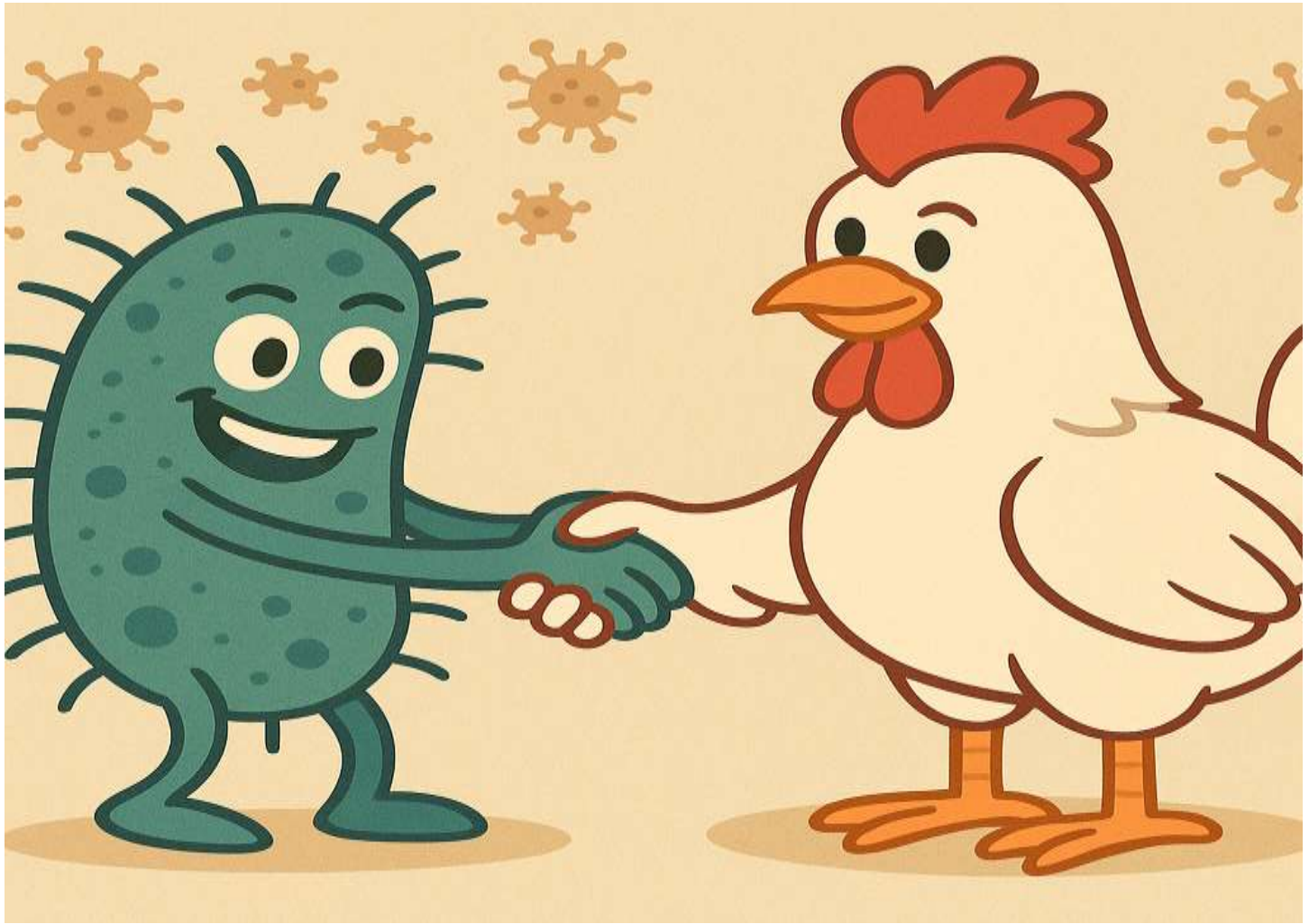

① Reaction mixture
• Primer and DNA template
• ddNTPs with flourochromes
• DNA polymerase
• dNTPs (dATP, dCTP, dGTP, and dTTP)
Primer
Template
ddNTPs
ddTTP
ddCTP
ddATP
ddGTP
② Primer elongation and chain termination
③ Capillary gel electrophoresis separation of DNA fragments
Capillary gel
Laser
Detector


Template DNA


Shotgun DNA fragmentation


DNA Sequencing


WANTED
DEAD OR ALIVE?
"OBLIGATE INTRACELLULAR PARASITES"
GOES BY THE ALIAS "VIRUS"
DEAD OR ALIVE?



MAPS

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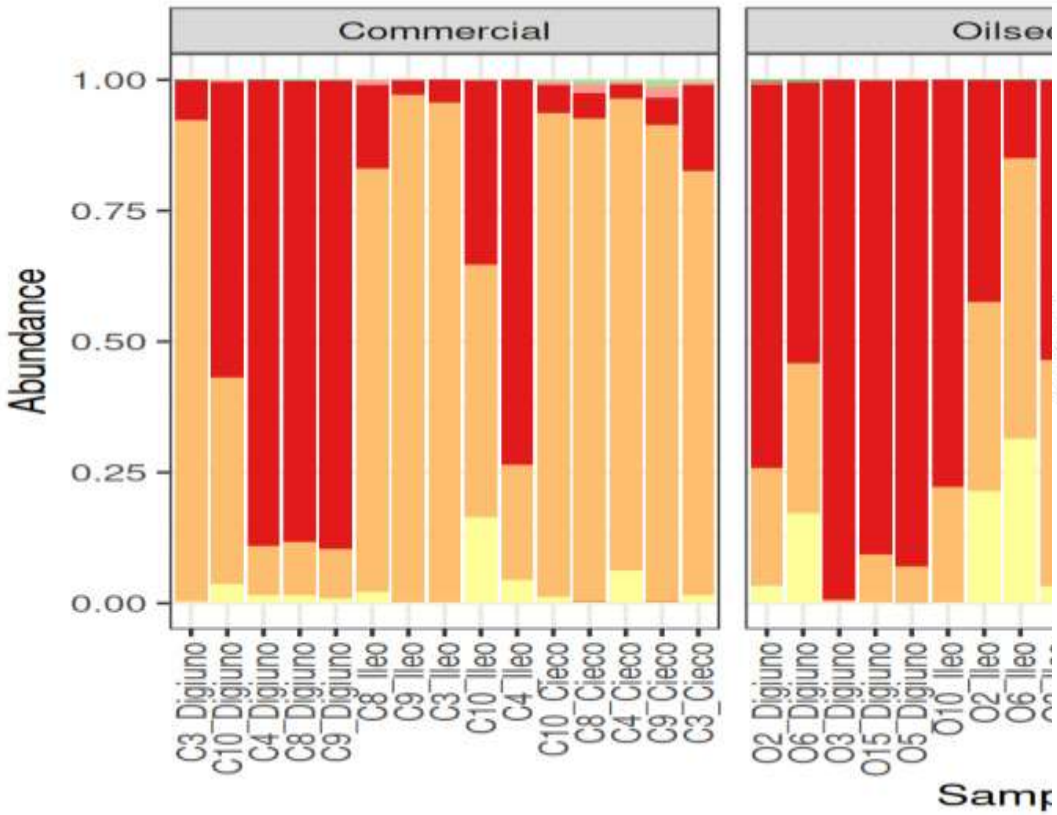

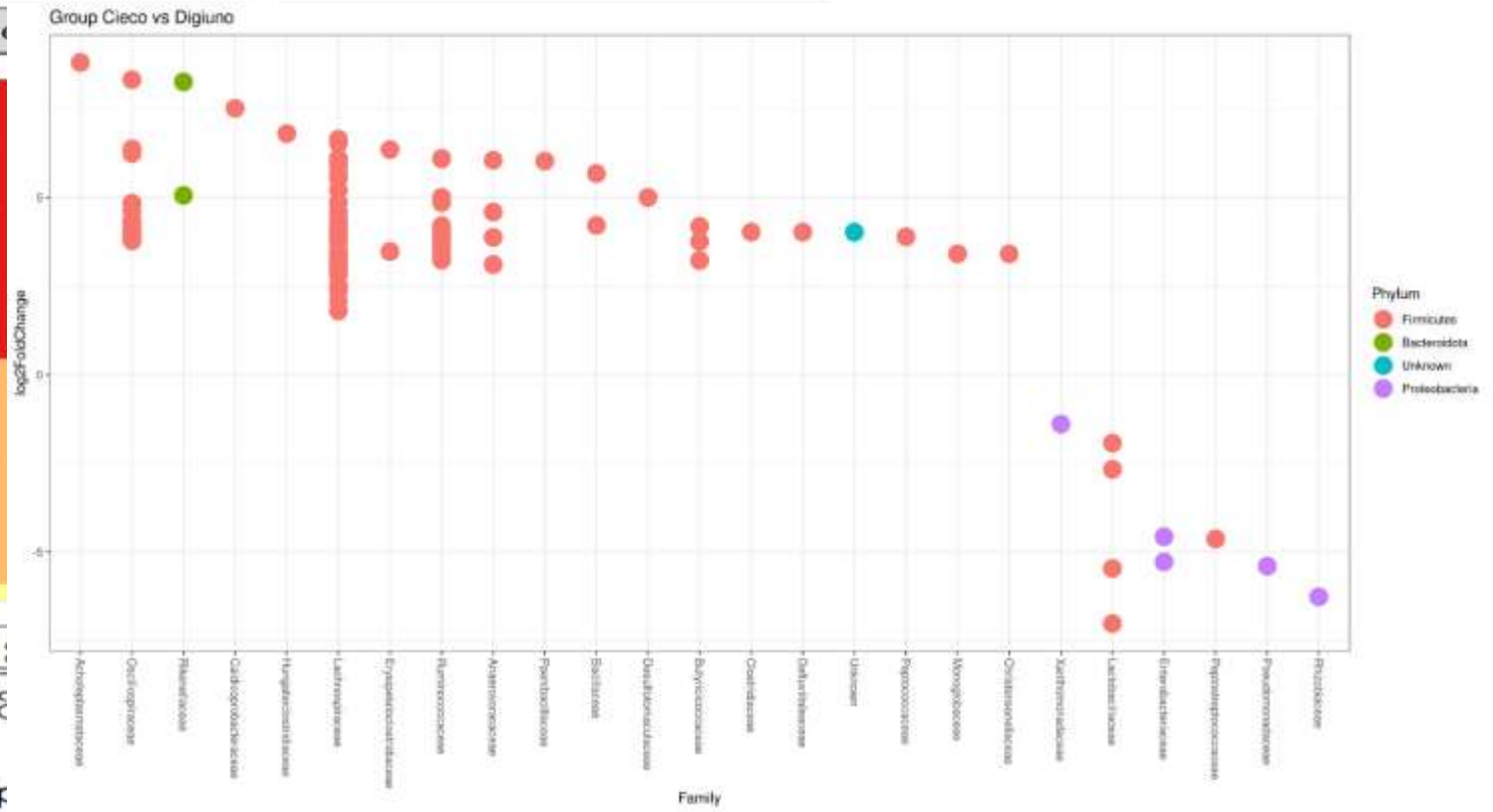

MAPS

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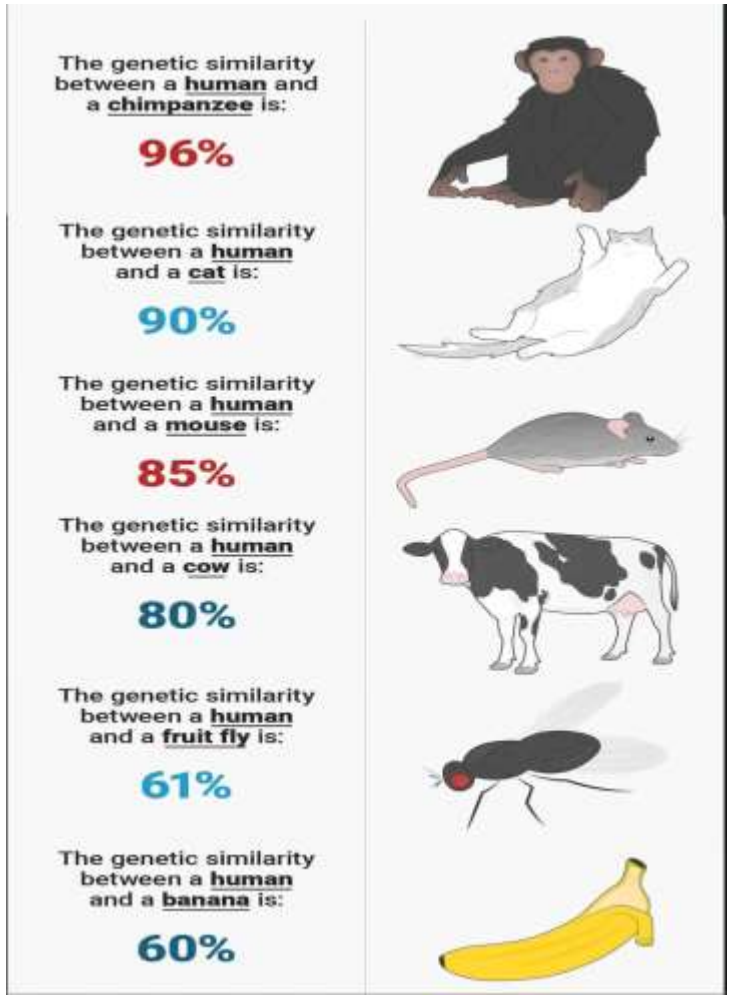
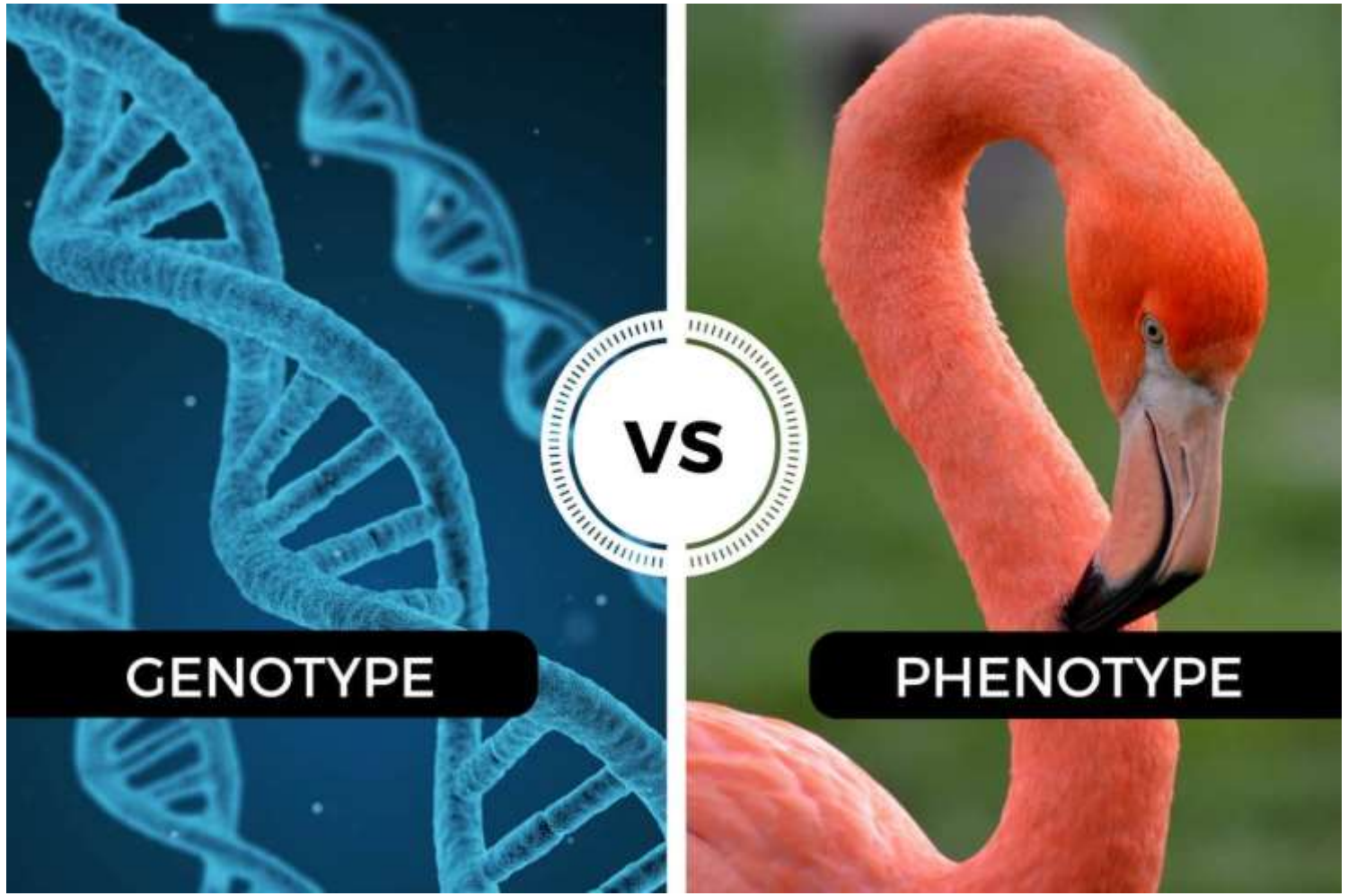
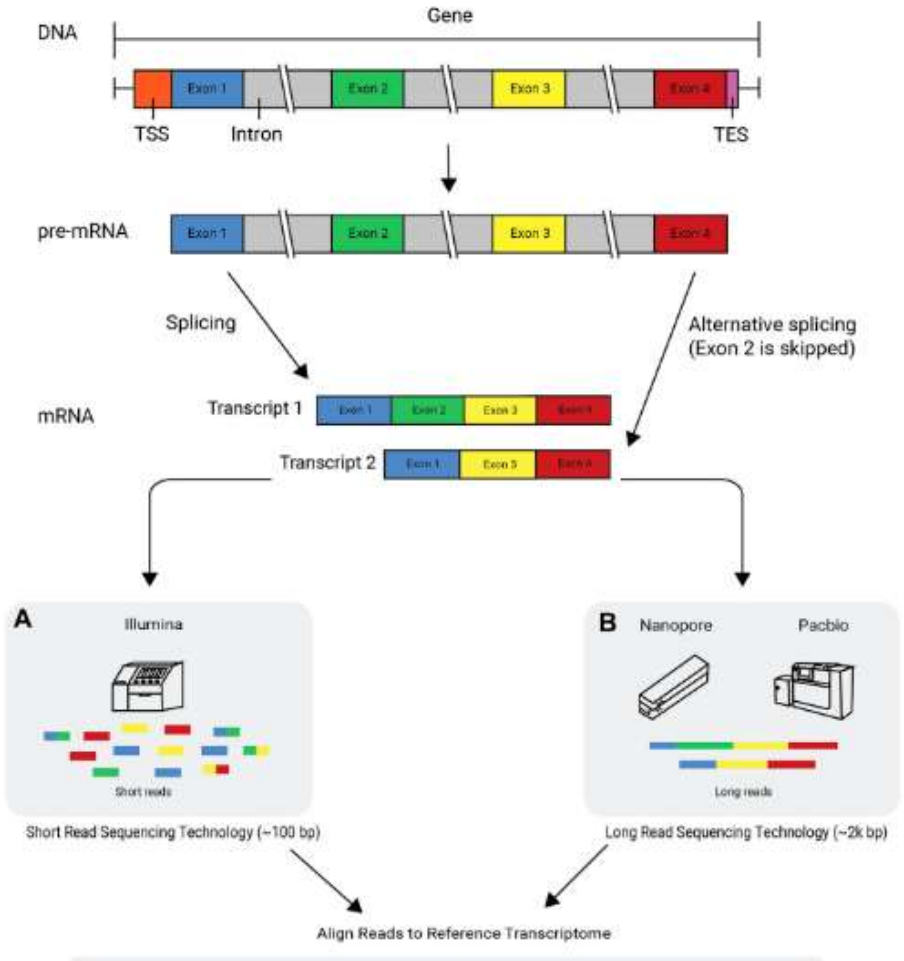
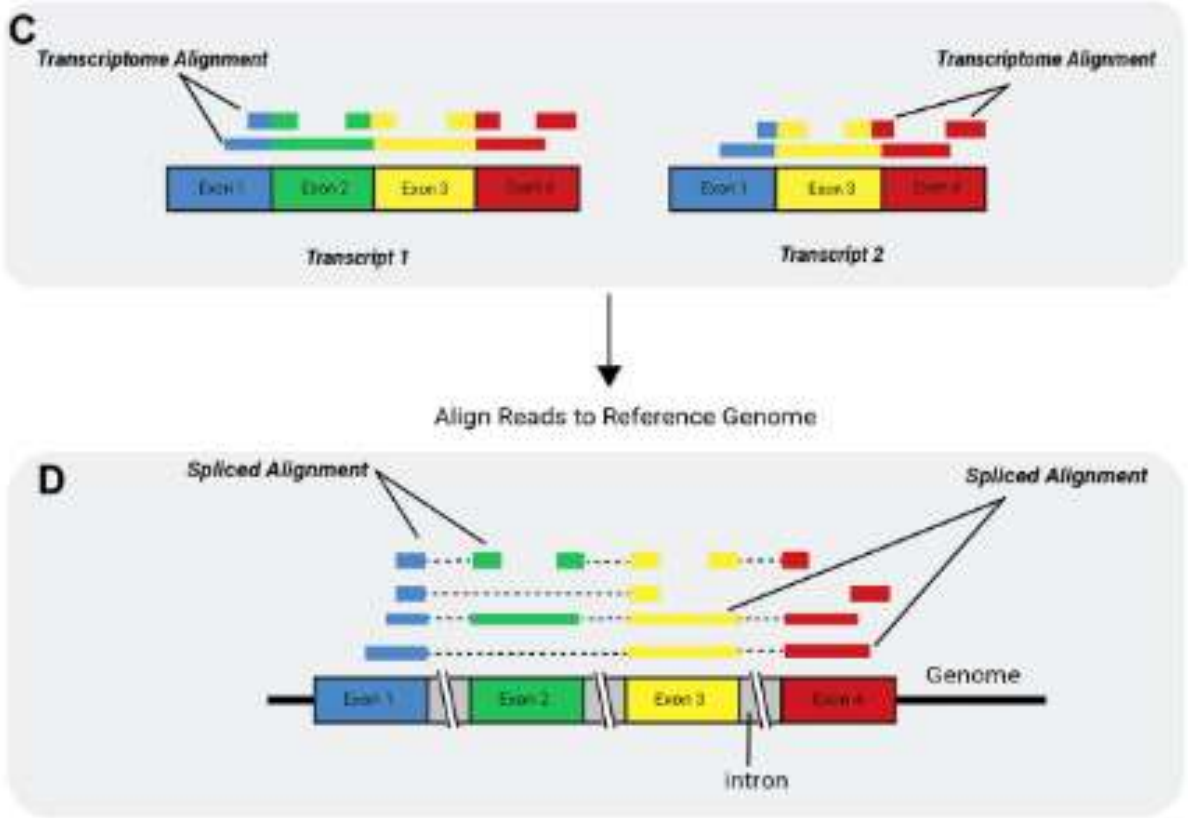

The genetic similarity between a human and a chimpanzee is:
96%
The genetic similarity between a human and a cat is:
90%
The genetic similarity between a human and a mouse is:
85%
The genetic similarity between a human and a cow is:
80%
The genetic similarity between a human and a fruit fly is:
61%
The genetic similarity between a human and a banana is:
60%


VS
GENOTYPE
PHENOTYPE


DNA
Gene
Exon 1
Exon 2
Exon 3
Exon 4
TSS
Intron
TES
pre-mRNA
Splicing
Alternative splicing
(Exon 2 is skipped)
mRNA
Transcript 1
Transcript 2
A
Illumina
Short reads
Short Read Sequencing Technology (~100 bp)
B
Nanopore
Pacbio
Long reads
Long Read Sequencing Technology (~2k bp)
Align Reads to Reference Transcriptome


C
Transcriptome Alignment
Transcriptome Alignment
Transcript 1
Transcript 2
Align Reads to Reference Genome
D
Spliced Alignment
Spliced Alignment
Genome
Exon 1
Exon 2
Exon 3
intron

MAPS

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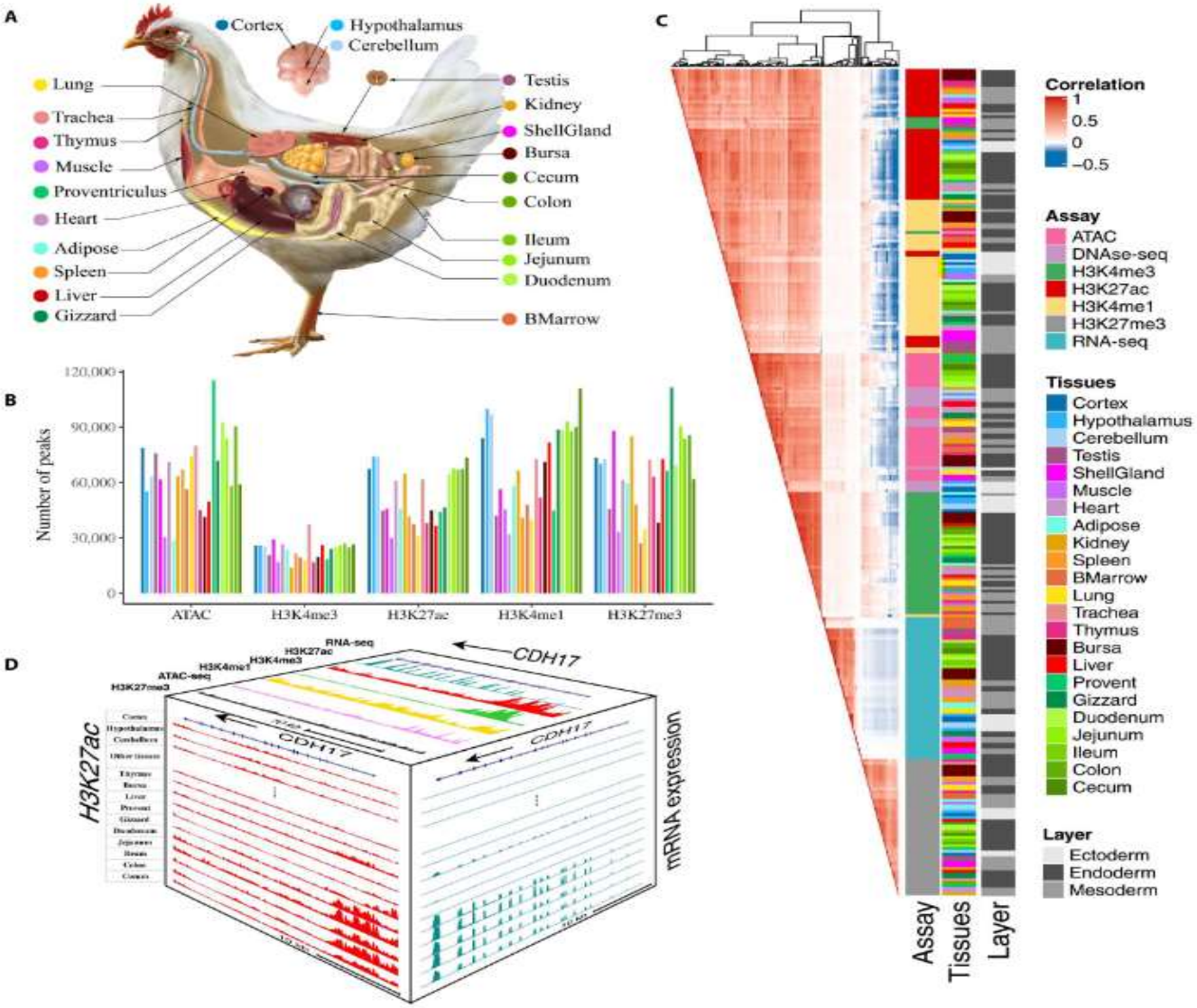
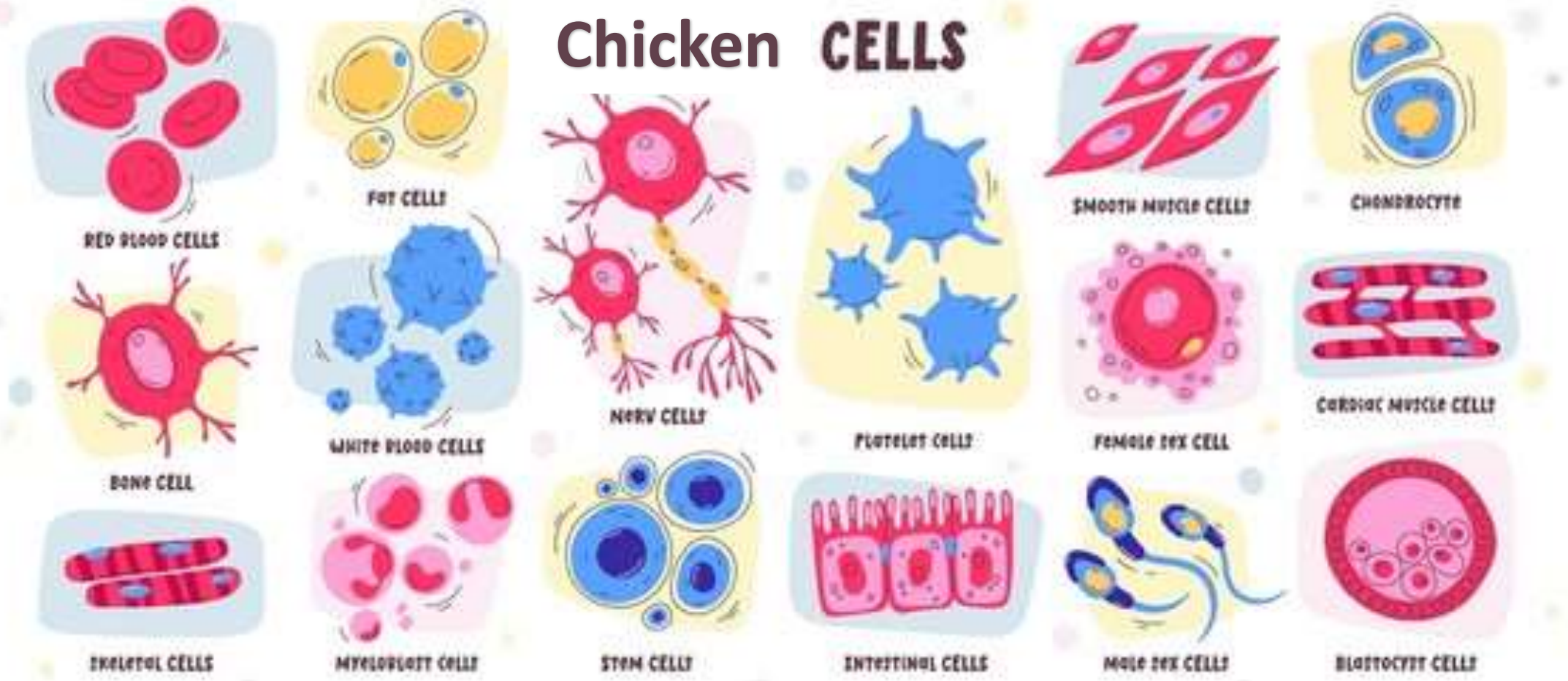
SCIENCE ADVANCES | RESEARCH ARTICLE

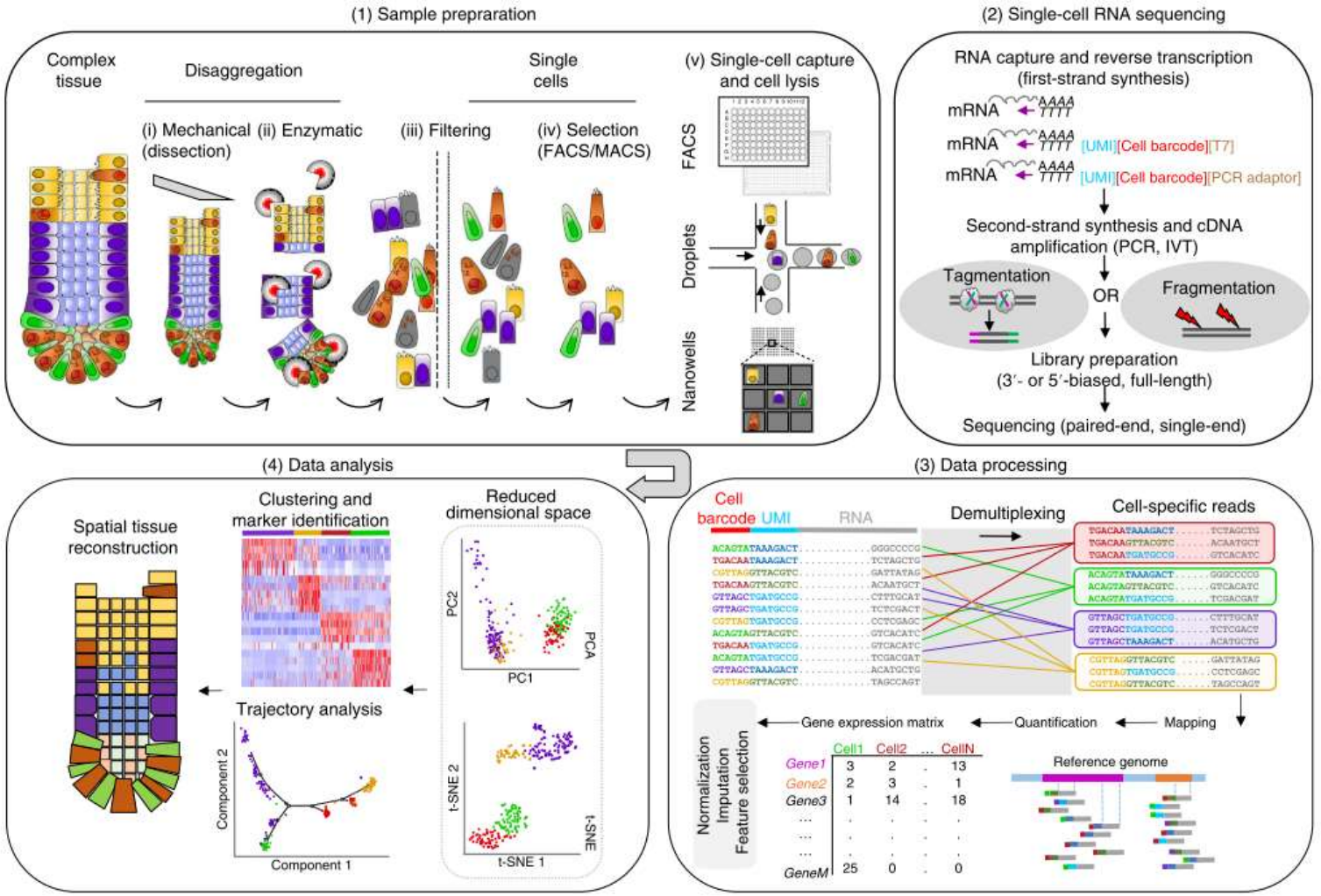
GENETICS

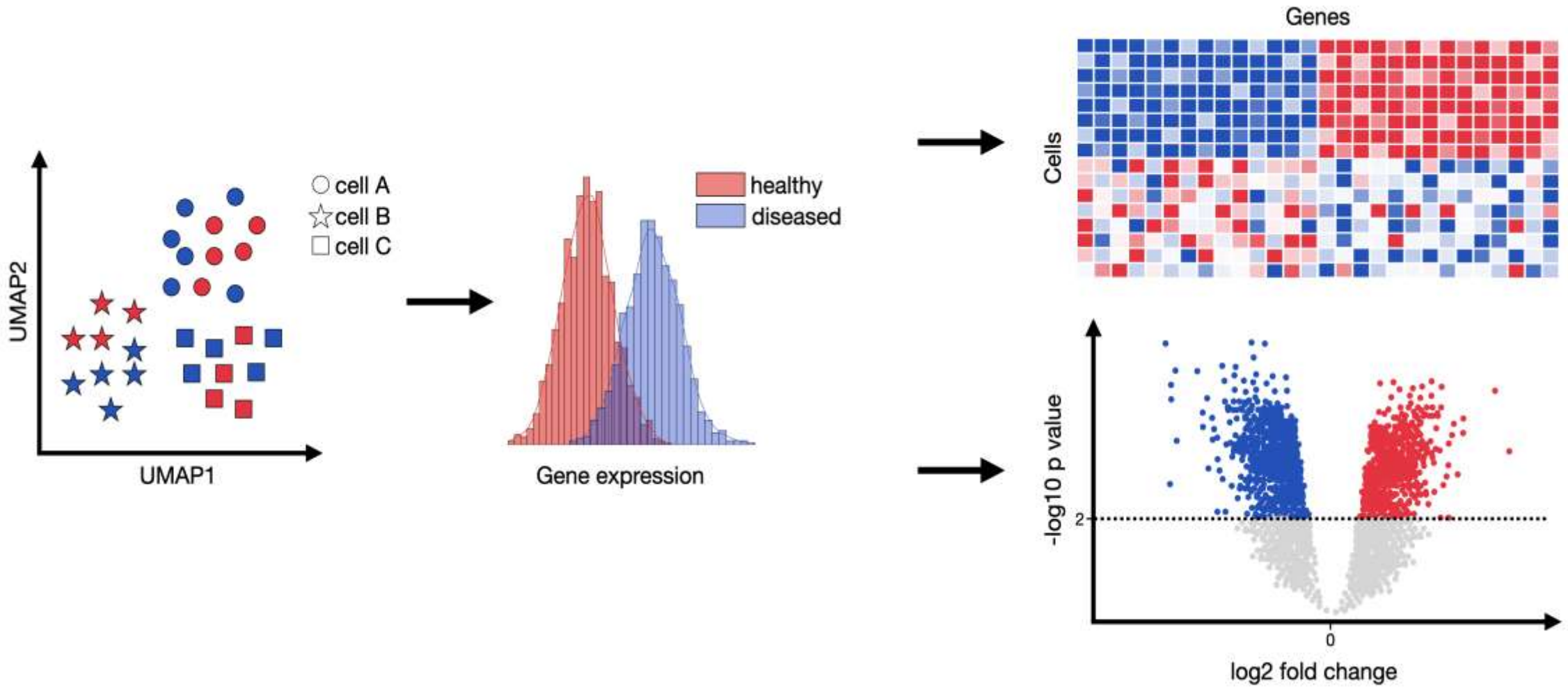
An atlas of regulatory elements in chicken: A resource for chicken genetics and genomics

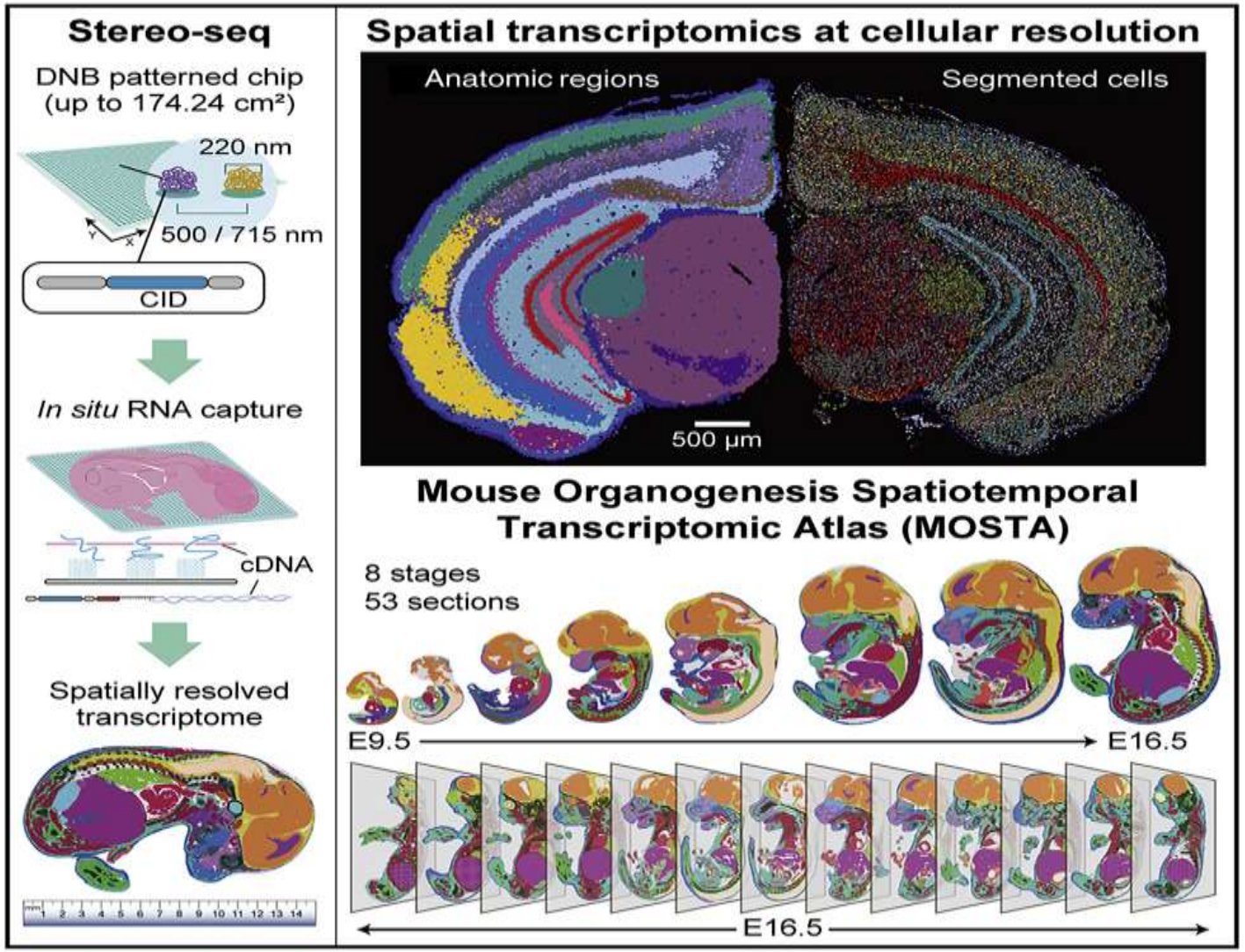
Zhangyuan Pan[1,2†], Ying Wang[1†], Mingshan Wang[3†], Yuzhe Wang[4†], Xiaoning Zhu[4], Shenwen Gu[1], Conghao Zhong[5], Liqi An[1], Mingzhu Shan[2], Joana Damas[6], Michelle M. Halstead[1], Dailu Guan[1], Nares Trakooljul[7], Klaus Wimmers[7,8], Ye Bi[1], Shang Wu[1], Mary E. Delany[1], Xuechen Bai[1], Hans H. Cheng[9], Congjiao Sun[5], Ning Yang[5], Xiaoxiang Hu[3], Harris A. Lewin[6,10], Lingzhao Fang[11,12*], Huaijun Zhou[1*]



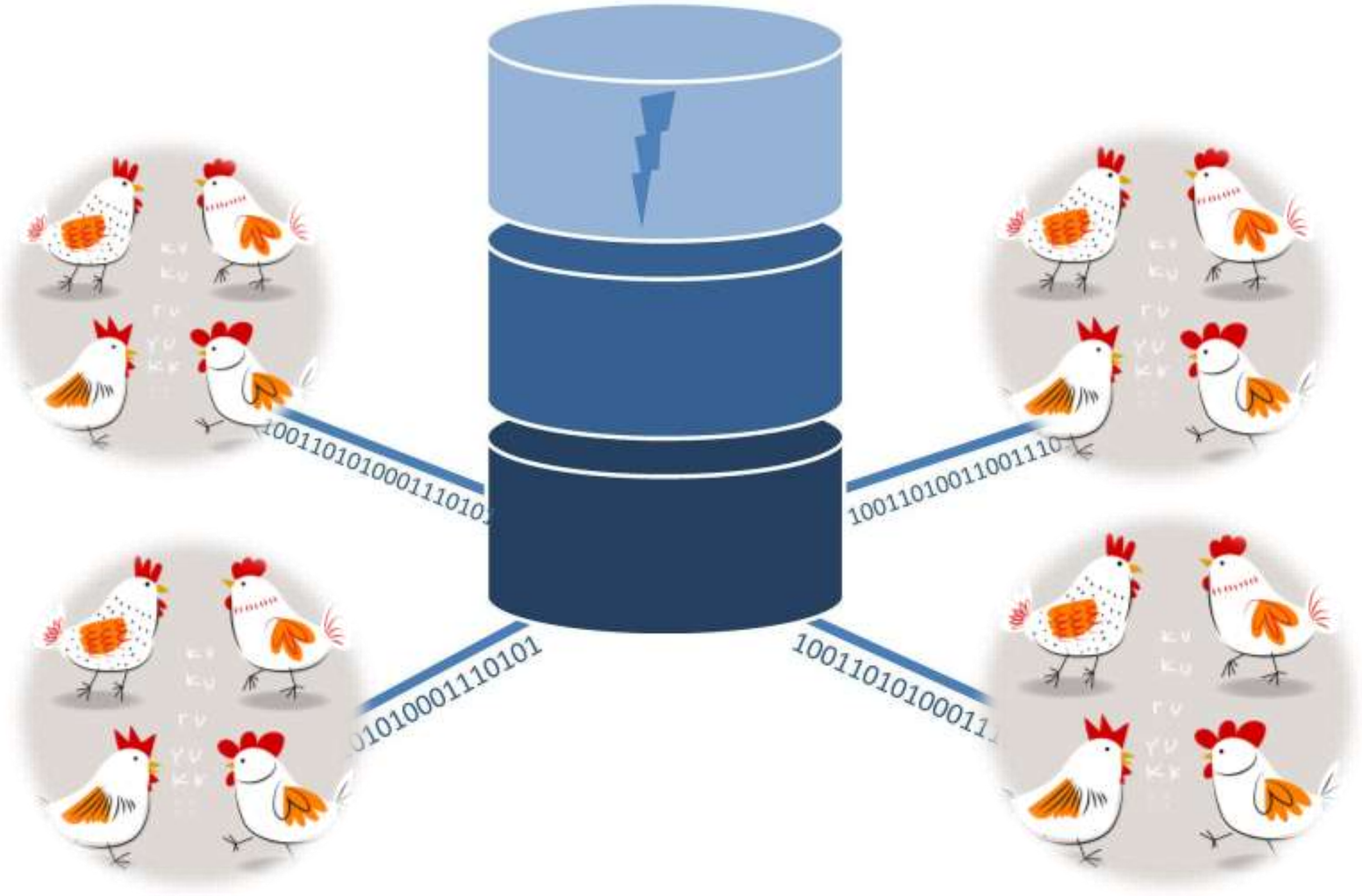

Chicken CELLS
RED BLOOD CELLS
FAT CELLS
NERV CELLS
SMOOTH MUSCLE CELLS
CHONDROCYTE
BONE CELL
WHITE BLOOD CELLS
PLATELET CELLS
FEMALE SEX CELL
CARDIAC MUSCLE CELLS
SKELETAL CELLS
MYELOBLAST CELLS
STEM CELLS
INTESTINAL CELLS
MALE SEX CELLS
BLASTOCYST CELLS
shutterstock.com · 2357584251


(1) Sample prepraration
Complex tissue
Disaggregation
Single cells
(i) Mechanical (dissection)
(ii) Enzymatic
(iii) Filtering
(iv) Selection (FACS/MACS)
(v) Single-cell capture and cell lysis
FACS
Droplets
Nanowells
(2) Single-cell RNA sequencing
RNA capture and reverse transcription (first-strand synthesis)
mRNA
[UMI][Cell barcode][T7]
[UMI][Cell barcode][PCR adaptor]
Second-strand synthesis and cDNA amplification (PCR, IVT)
Tagmentation
OR
Fragmentation
Library preparation (3′- or 5′-biased, full-length)
Sequencing (paired-end, single-end)
(3) Data processing
Cell barcode
UMI
RNA
Demultiplexing
Cell-specific reads
Gene expression matrix
Quantification
Mapping
Normalization
Imputation
Feature selection
Cell1
Cell2
CellN
Gene1
Gene2
Gene3
GeneM
Reference genome
(4) Data analysis
Spatial tissue reconstruction
Clustering and marker identification
Reduced dimensional space
PC1
PC2
PCA
t-SNE 1
t-SNE 2
t-SNE
Trajectory analysis
Component 1
Component 2


cell A
cell B
cell C
UMAP2
UMAP1
healthy
diseased
Gene expression
Genes
Cells
-log10 p value
2
0
log2 fold change


Stereo-seq
DNB patterned chip
(up to 174.24 cm²)
220 nm
500 / 715 nm
CID
In situ RNA capture
cDNA
Spatially resolved
transcriptome
Spatial transcriptomics at cellular resolution
Anatomic regions
Segmented cells
500 μm
Mouse Organogenesis Spatiotemporal
Transcriptomic Atlas (MOSTA)
8 stages
53 sections
E9.5
E16.5
E16.5


SIDE
EFFECTS


1001101010001110101
1001101001100111
0101000111010
100110101000111

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RaiNews.it Video Cronaca Esteri Politica Sport ··· | News regionali Tgr | Rai News 24 • LIVE

Temi Caldi → La guerra dei dazi | La guerra in Ucraina | Israele-Hamas, ancora guerra | Pasqua | Violenza sulle donne | La crisi del clima

Esteri > Guerre e conflitti

Ucraina sotto pressione

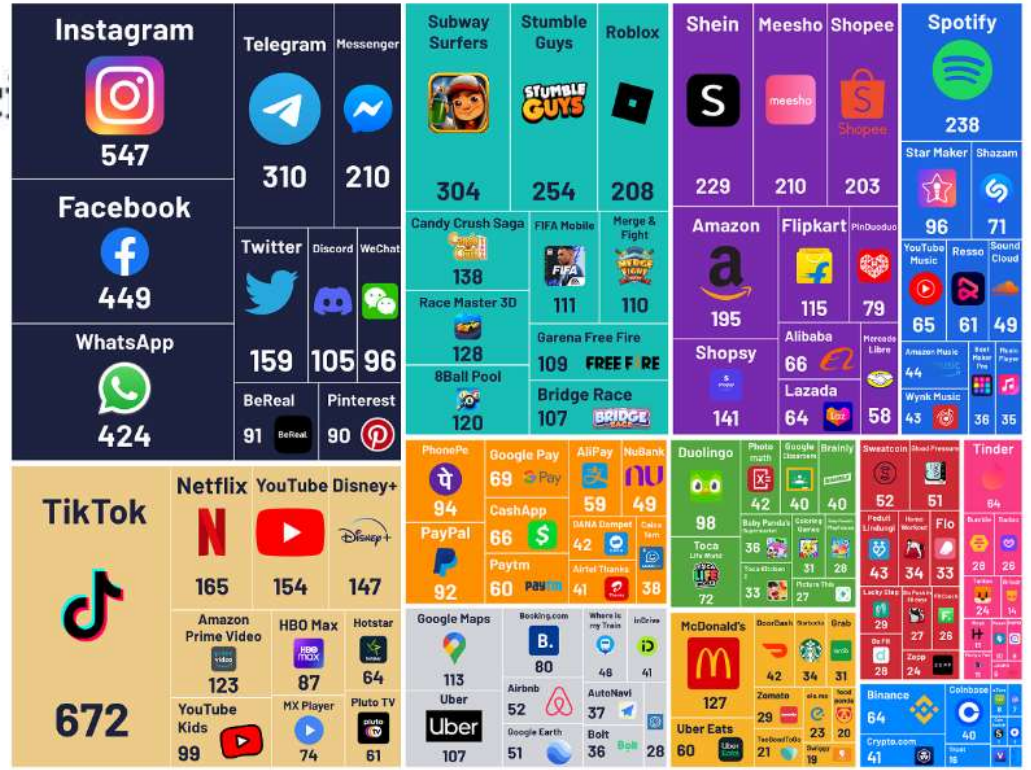
Musk e il sostegno di Starlink a Kiev, prima minacc di toglierlo e poi smentisce

Il magnate di Tesla: "Se spengo i miei satelliti crolla il fronte ucraino". Il ministro degli Esteri polacco si preoccupa. Musk lo insulta: "Zitto, ometto"

Il Sole 24 ORE

Most popular apps worldwide

2022, by category (million downloads)




Data
Protection
& Privacy


Data
Protection
& Privacy

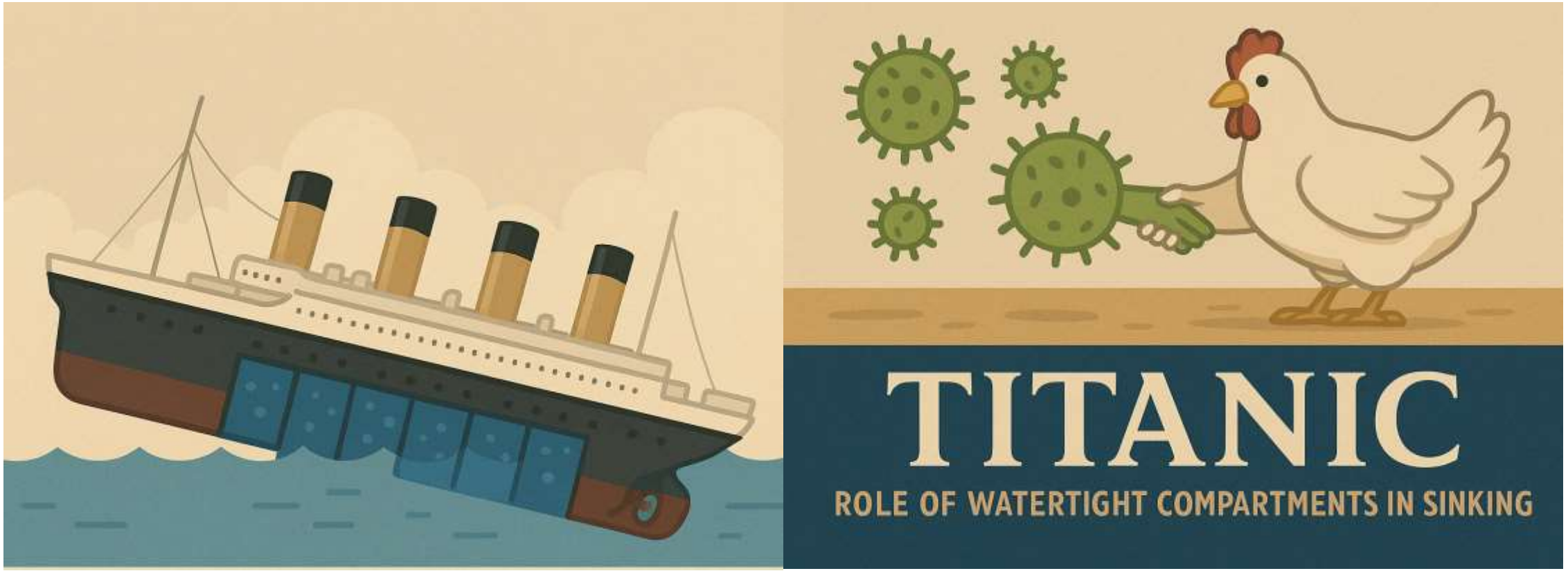

DISPUTE RESOLUTION

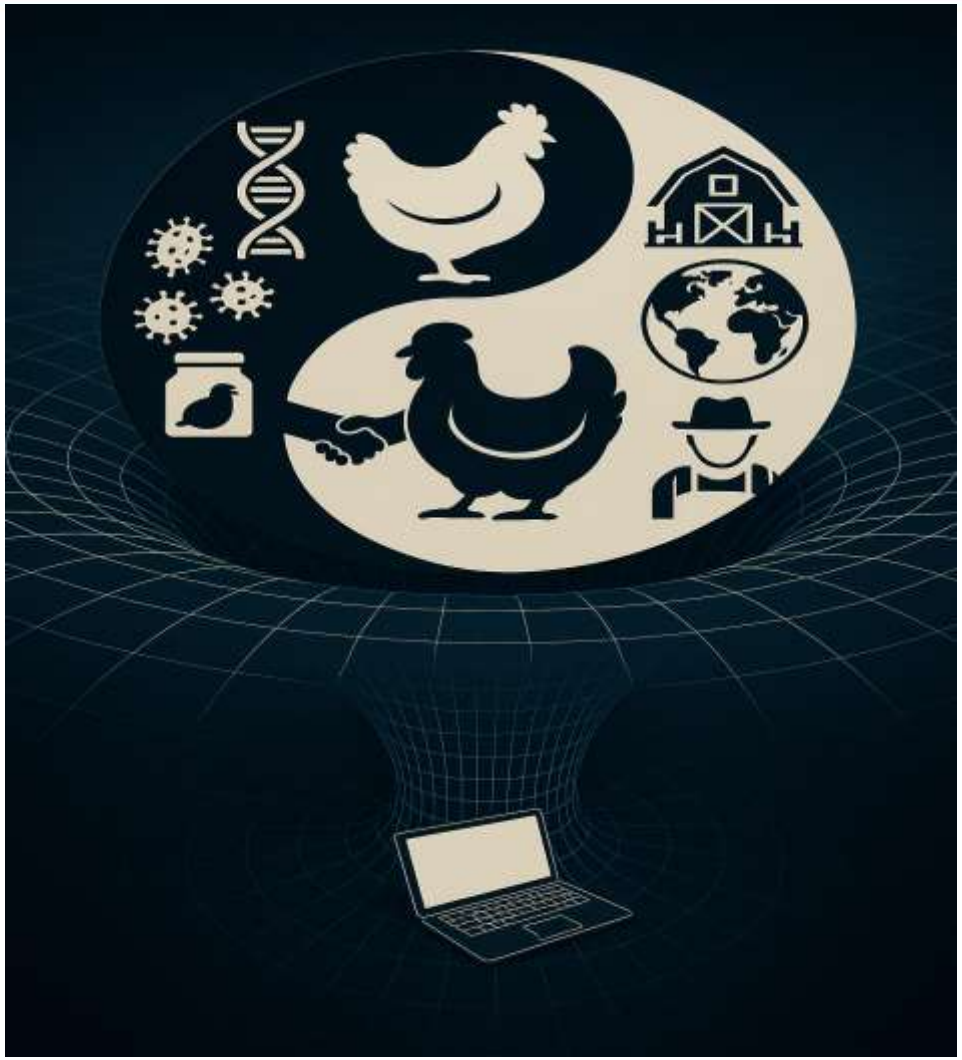

Data
Protection
& Privacy

Gelosia

Data sharing


Language
Linguaggio
Język
Lenguaje
Langage
Linguagem
Wika
Ngôn ngữ
Sprache
Bahasa


TITANIC
ROLE OF WATERTIGHT COMPARTMENTS IN SINKING



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HUMAN HEALTH
ONE HEALTH
ANIMAL HEALTH
ENVIRONMENTAL HEALTH

MAPS

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data

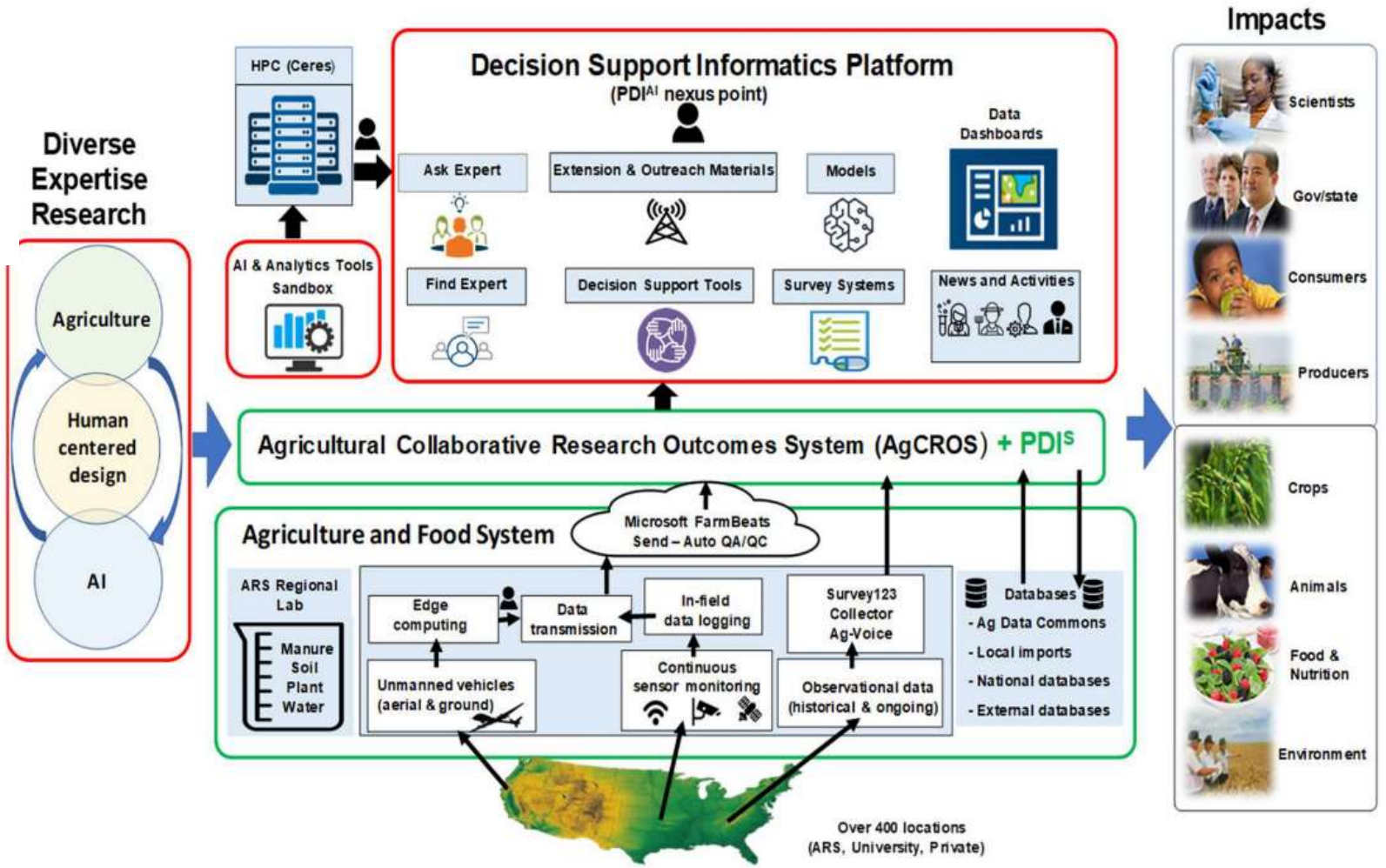
MDPI

Article

Linking and Sharing Technology: Partnerships for Data Innovations for Management of Agricultural Big Data

Tulsi P. Kharel [1,*], Amanda J. Ashworth [2] and Phillip R. Owens [3]

[1] USDA-ARS, Crop Production Systems Research Unit, Stoneville, MS 38776, USA
[2] USDA-ARS, Poultry Production and Product Safety Research Unit, Fayetteville, AR 72704, USA; amanda.ashworth@usda.gov
[3] USDA-ARS, Dale Bumpers Small Farms Research Center, Booneville, AR 72927, USA; phillip.owens@usda.gov
* Correspondence: tulsi.kharel@usda.gov




Develop a powerful AI
Teach it to write code
Have the AI replace you as developer
Have the AI replace you as developer
imgflip.com

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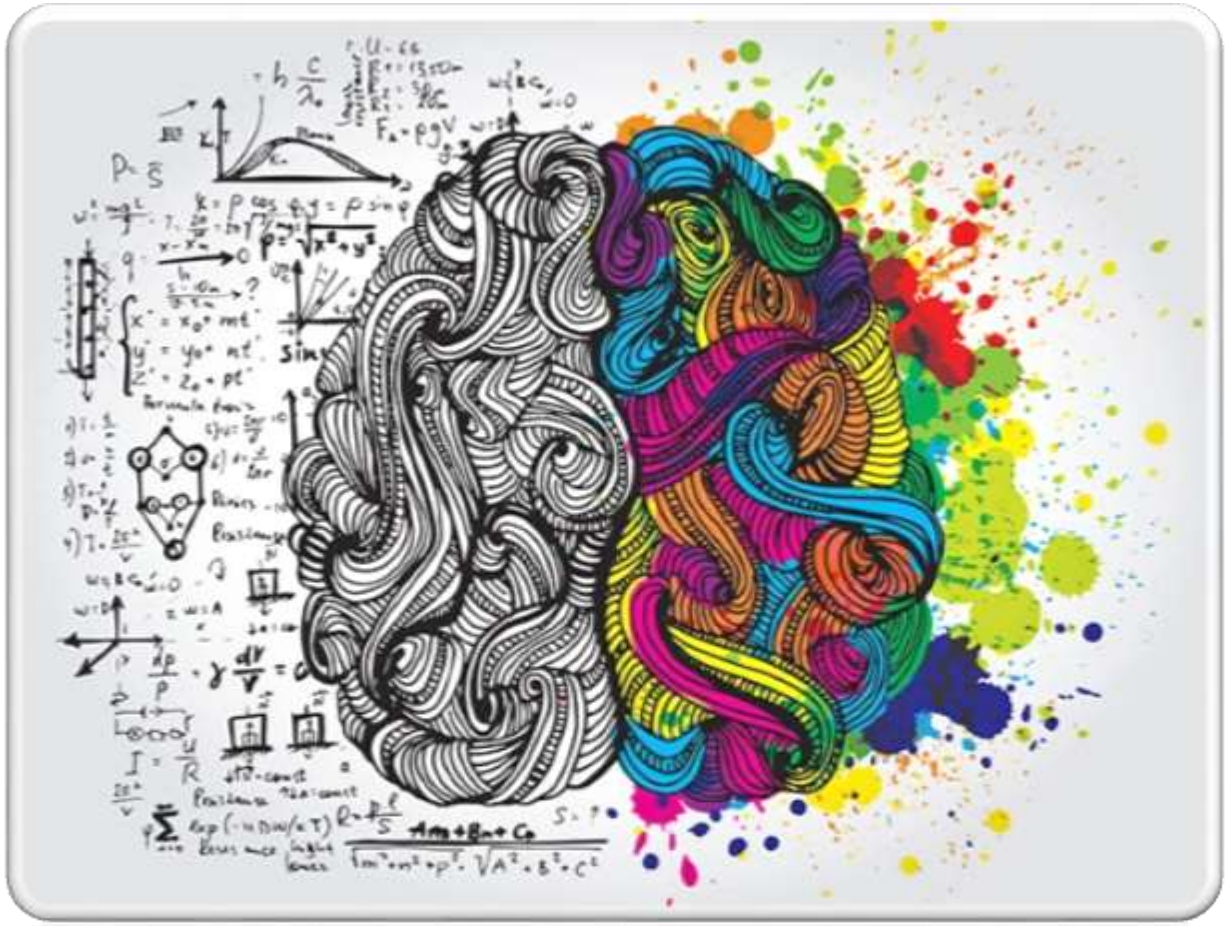


TRANQUILLO, L'AI NON TI RUBERÀ IL LAVORO...


MA IL TIZIO CHE LA SA USARE SÌ.


Grazie per l'attenzione