



Do Mineral Pecking Blocks Support Laying Hens' Ca Appetite?

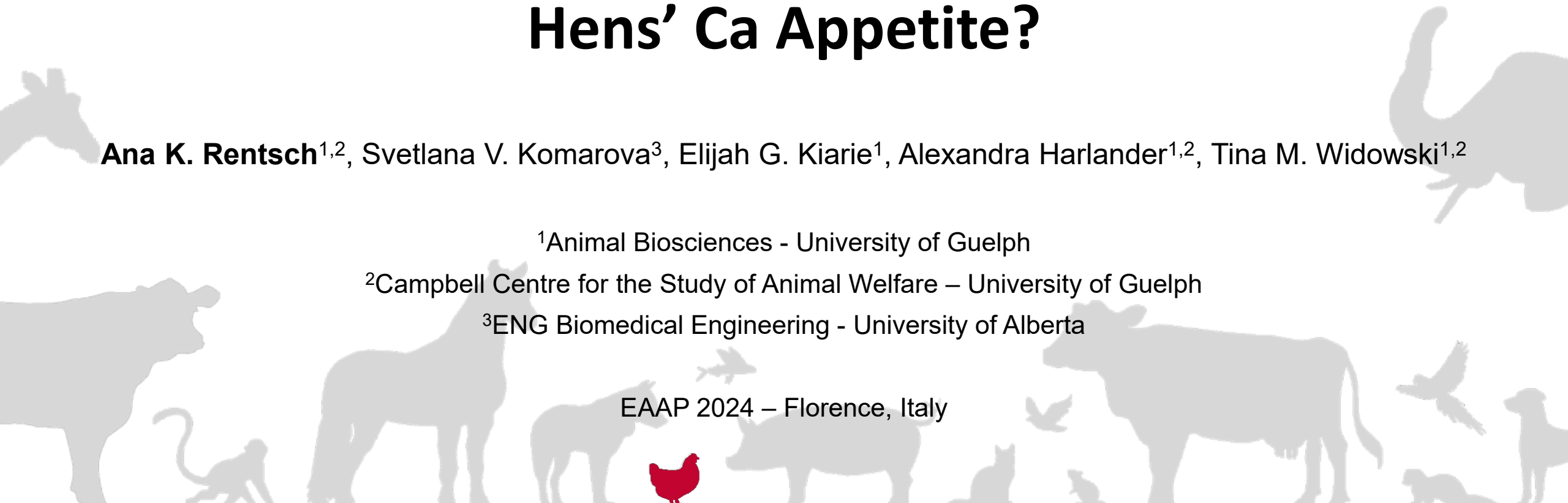
Ana K. Rentsch^{1,2}, Svetlana V. Komarova³, Elijah G. Kiarie¹, Alexandra Harlander^{1,2}, Tina M. Widowski^{1,2}

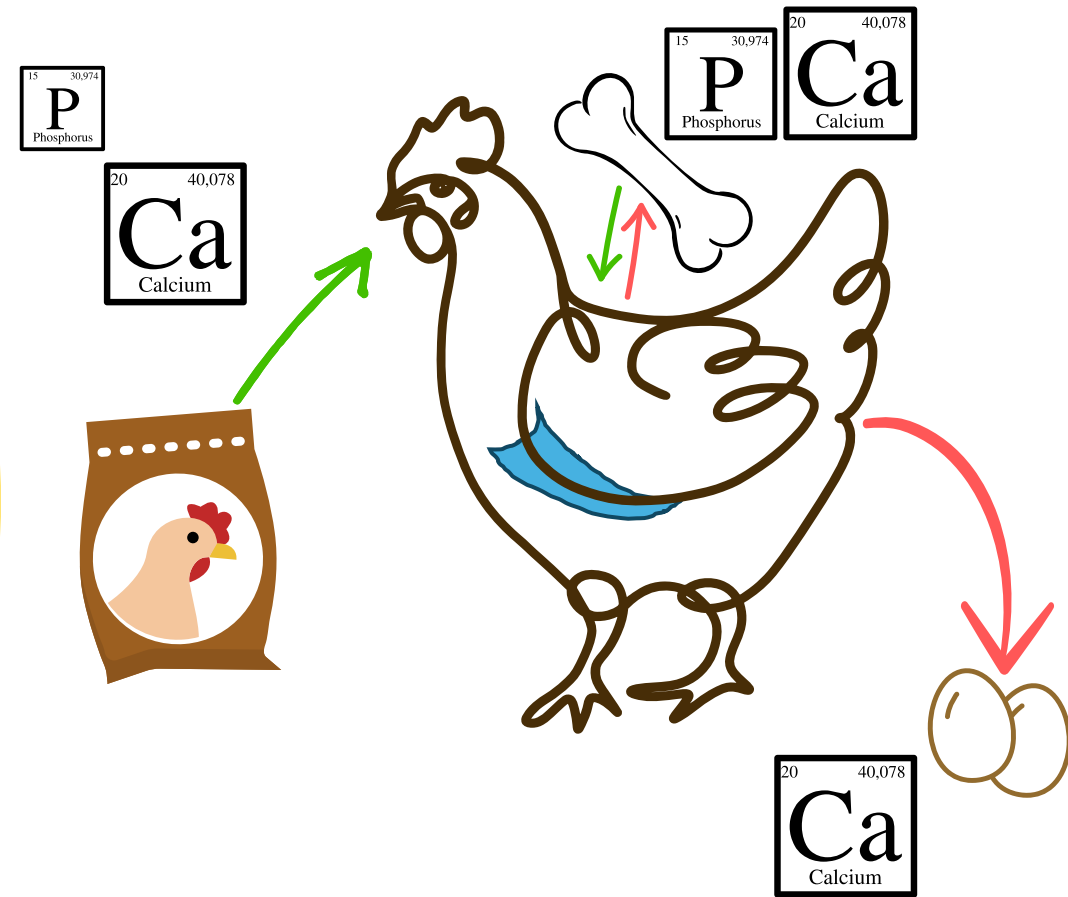
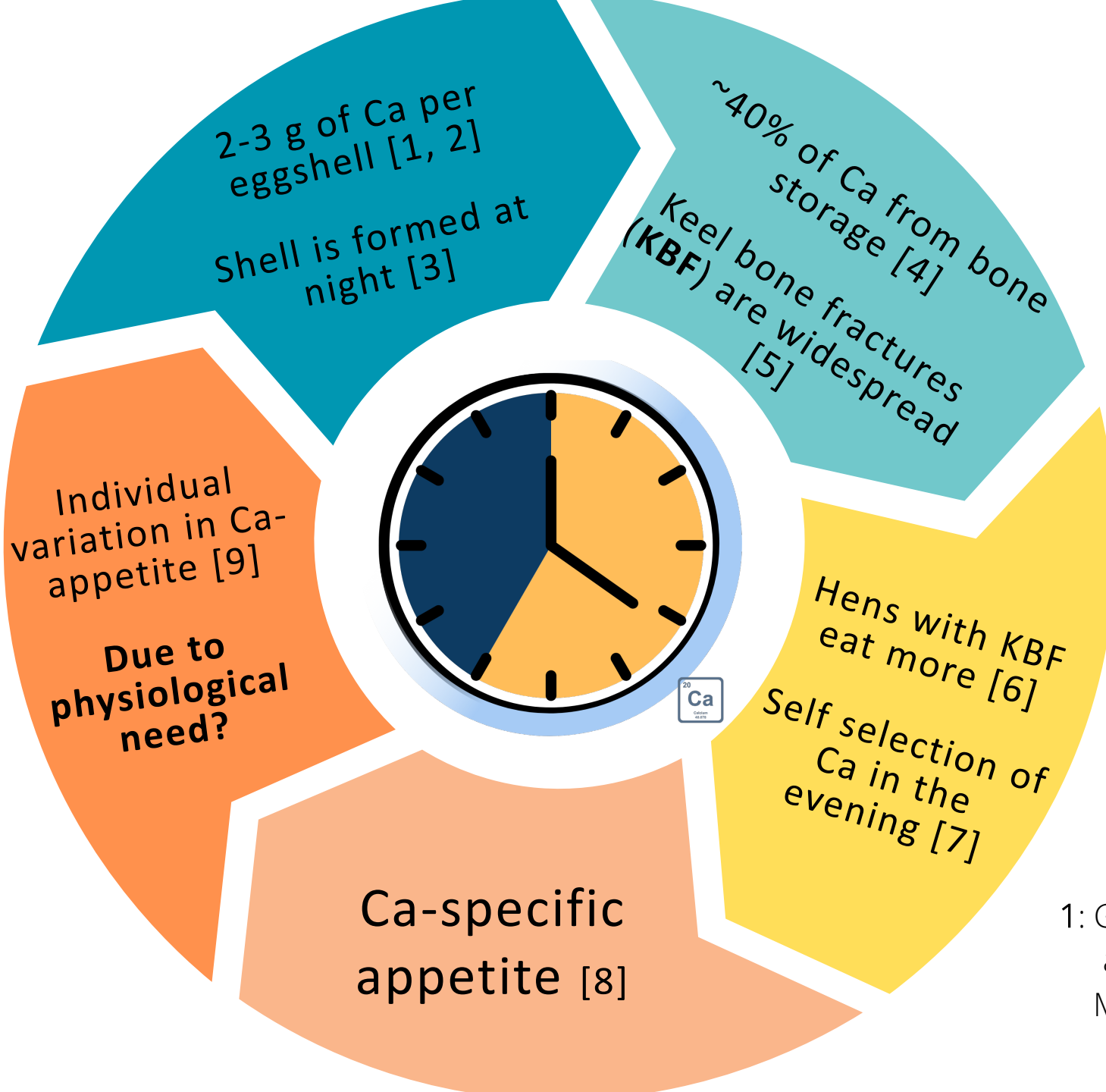
¹Animal Biosciences - University of Guelph

²Campbell Centre for the Study of Animal Welfare – University of Guelph

³ENG Biomedical Engineering - University of Alberta

EAAP 2024 – Florence, Italy





- 1: Gilbert, 1983; 2: Ketta and Tůamová, 2016; 3: Anderson et al., 2013; 4: Comar and Driggers, 1949; 5: Rufener and Makagon, 2020; 6: Nasr et al., 2013; 7: Hughes, 1972; 8: Todoff, 2001; 9: Griminger and Lutz, 1964

Research goal

Examined hens' self selection of mineral pecking blocks (**PB**) in the context of...

... genetic strain

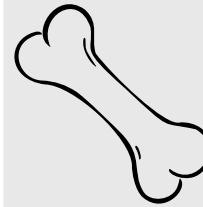
... keel bone health

... egg production

... age

Ca:P

10:1



20:1



PB1: 20% Ca, 2% P



PB2: 20% Ca, 1% P

Individual metabolic cages

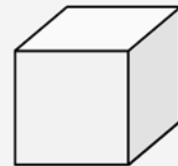


Nest curtain

Perch



2 genetic strains
Bovans Brown & Dekalb White



2 types of PBs
different Ca:P ratios

Experimental design

96 hens with experience of post-ingestive feedback

week of age

52

Acclimatization

PBs for everyone - 2wks
Feed & PB disappearance

59

61

Data collection P1

Egg collections 7 days
Feed & PB disappearance
Blood collections day 7
X-rays day 7

Data collection P2

Period 2 start

PBs for 1/2 the hens

Period 1 start

PBs for 1/2 the hens

22 brown hens (B)

20 white hens (W)

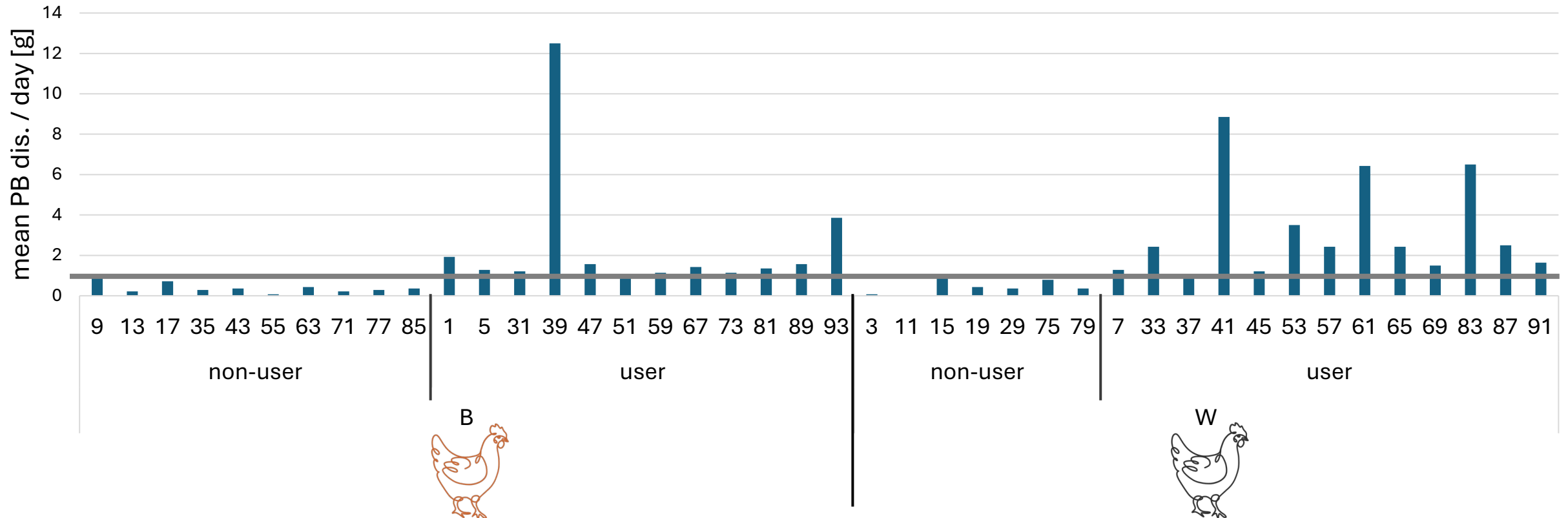


Data processing

1

PB DISAPPEARANCE

- Mean PB dis. per day
- Categorize hens as PB 'users' or 'non-users'
 - 'users': PB dis. > 1 g / day



Data processing

1	PB DISAPPEARANCE	• Mean PB dis. per day • Categorize hens as PB 'users' or 'non-users' ◦ 'users': PB dis. > 1g / day
2	X RAYS	• Keel bone fracture [KBF] severity ◦ continuous score 0 - 5 ◦ 5 = most severe Rufener et al., 2018
3	EGGS	• Production as a percentage • 7 eggs in 7 days eggs = 100 %
4	FEED	• Mean feed dis. per day • Corrected for body weight [g/kg]
5	PB PREFERENCE	• $Preference\ ratio = \frac{PB1\ dis.}{PB1\ dis. + PB2\ dis.}$ • PB1 preference: ratio > 0.6 • No preference: ratio 0.6 – 0.4 • PB2 preference: ratio < 0.4

PB disappearance

Linear regression model

Outcome variable: PB dis. [g/day]

Predictors: KBF severity

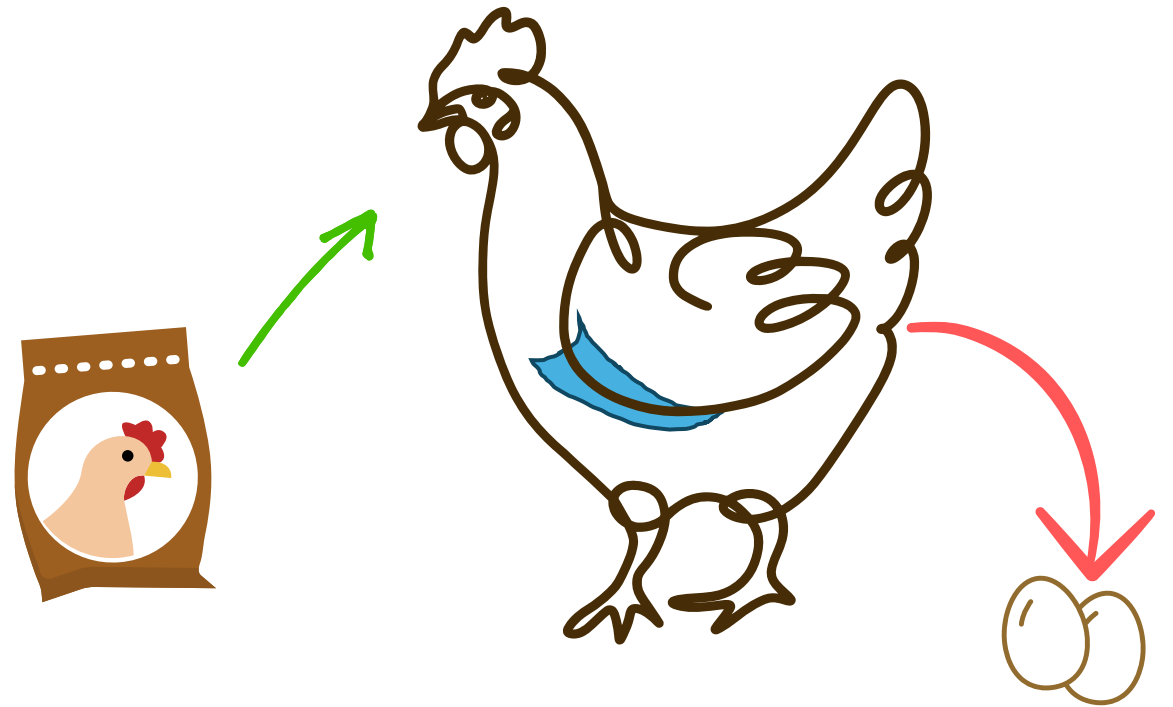
Genetic strain

Egg production [%]

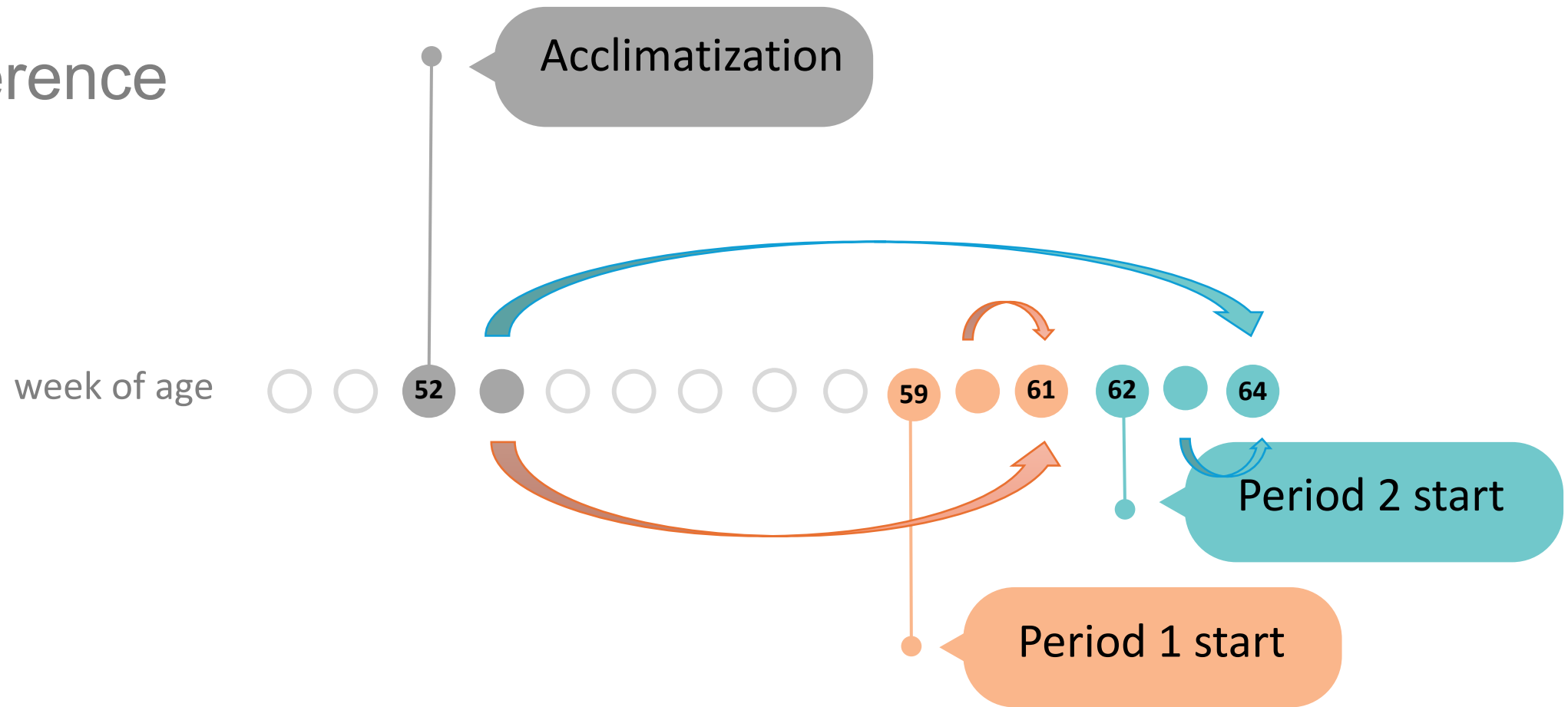
Age

Feed dis./BW [g/kg]

Statistical unit: Hen



Preference



Long-term preference

Short-term preference

Kendall's coefficient of concordance (**Wt**)

- Non-parametric statistic for rank correlation
- Also used for inter-rater reliability

Results

Preference

Preferences were statistically inconsistent.

- Long-term: $W_t=0.47$, $P=0.6$
- Short-term: $W_t=0.56$, $P=0.2$

PB disappearance

PB disappearance was affected by age only.

- KBF severity: $F=3.1$, $P<0.1$
- Strain: $F=1.1$, $P=0.5$
- Egg production: $F=0.4$, $P=0.5$
- **Age: $F=8.9$, $P=0.006$ ($\uparrow$ with age)**
- Feed dis./BW: $F=0.1$, $P=0.8$

Results

Preference

Preferences were statistically inconsistent .

- Long-term: $Wt=0.47$, $P=0.6$
- Short-term: $Wt=0.56$, $P=0.2$

Let's have a closer look!



General non-user

No long-term preference for either PB and a PB disappearance equal to or less than 1g/day.

PB type 1 non-user

Long-term preference for the PB with a Ca:P ratio of 10:1 and a PB disappearance equal to or less than 1g/day.

PB type 1 user

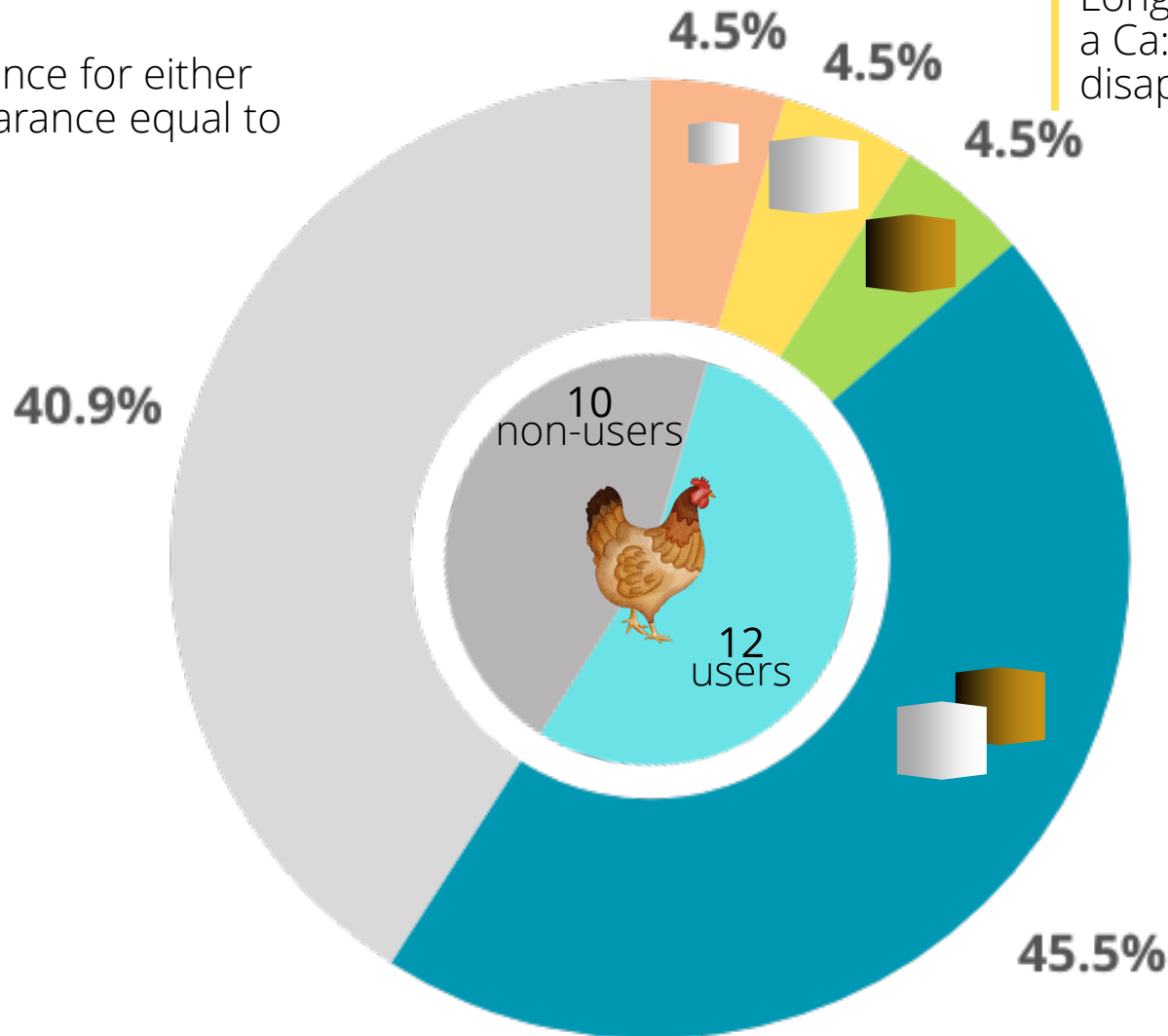
Long-term preference for the PB with a Ca:P ratio of 10:1 and a PB disappearance of more than 1g/day.

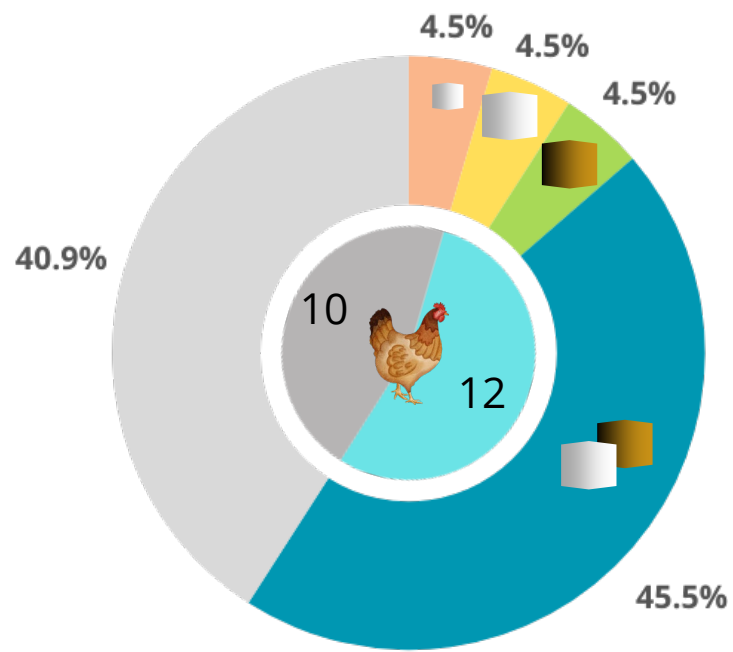
PB type 2 user

Long-term preference for the PB with a Ca:P ratio of 20:1 and a PB disappearance of more than 1g/day.

General PB user

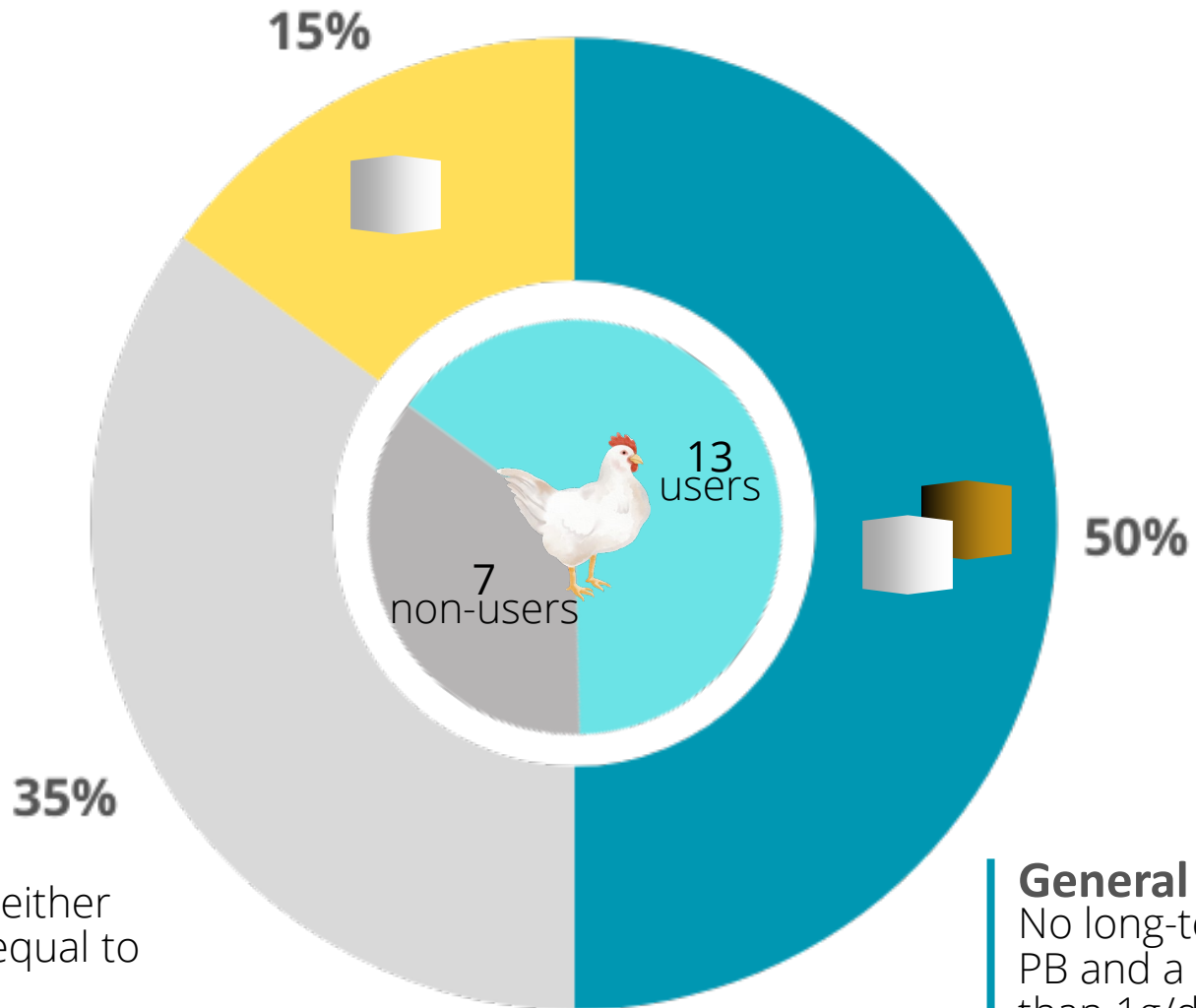
No long-term preference for either PB and a PB disappearance of more than 1g/day.





PB type 1 user

Long-term preference for the PB with a Ca:P ratio of 10:1 and a PB disappearance of more than 1g/day.



General non-user

No long-term preference for either PB and a PB disappearance equal to or less than 1g/day.

General PB user

No long-term preference for either PB and a PB disappearance of more than 1g/day.

Take-home messages

1. Very few hens had a long-lasting preference

- 15% of whites, 9% of browns

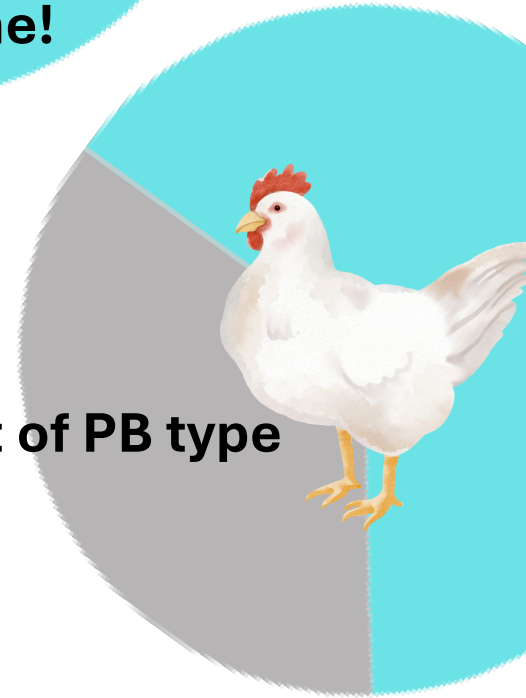
Preferences for enrichment type might not be constant across time!



2. PB use and PB preference appear unrelated

- No preference needed for a high PB use!
- More than 50% users (W: 65%, B: 54.5%)

Voluntary intake of supplemental Ca in <50% of hens independent of PB type



3. PB dis. was higher in older hens

Older hens might benefit from mineral PB



Thank you!

My PIs:

Dr Tina Widowski
Dr Alexandra Harlander

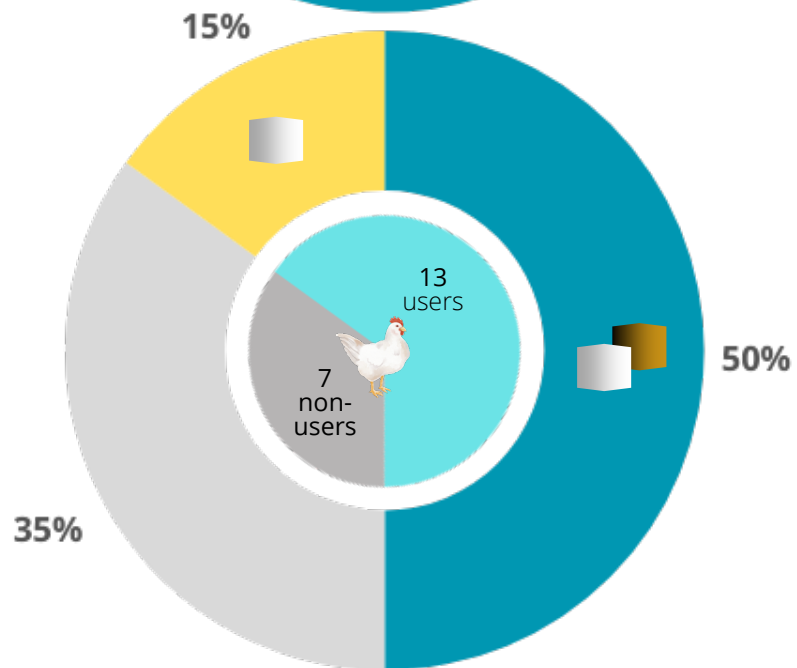
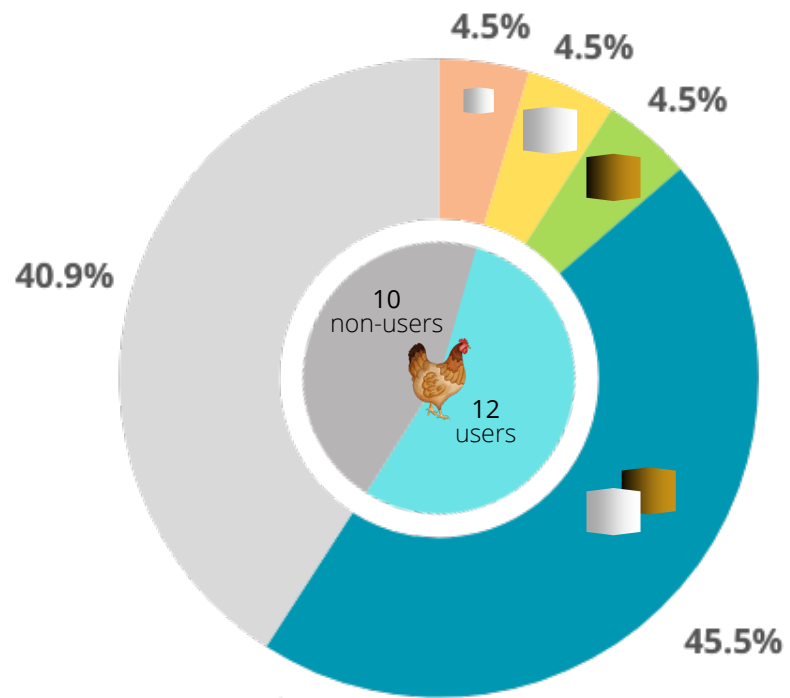
My co-authors:

Dr Svetlana Komarova
Dr Elijah Kiarie

Our funding agencies!



arentsch@uoguelph.ca
LinkedIn – Ana Rentsch



- General PB user**
No long-term preference for either PB and a PB disappearance of more than 1g/day.
- General non-user**
No long-term preference for either PB and a PB disappearance equal to or less than 1g/day.
- PB type 1 non-user**
Long-term preference for the PB with a Ca:P ratio of 10:1 and a PB disappearance equal to or less than 1g/day.
- PB type 1 user**
Long-term preference for the PB with a Ca:P ratio of 10:1 and a PB disappearance of more than 1g/day.
- PB type 2 user**
Long-term preference for the PB with a Ca:P ratio of 20:1 and a PB disappearance of more than 1g/day.
- PB type 2 non-user**
Long-term preference for the PB with a Ca:P ratio of 20:1 and a PB disappearance equal to or less than 1g/day.

