



How dual-purpose is dual-purpose? The balancing act between fattening and laying performance: An index to describe dual-purpose poultry

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Session 2. Breeding scheme optimization: balancing breeding goal(s), genetic progress and diversity

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Outline for today's presentation

1. Status of Chick Culling in Europe
2. What is Dual-Purpose Poultry?
3. PPILOW Project – on-station trials
 - a) Materials & Methods
 - b) Results
 - c) Conclusion
4. Quantification of dual-purpose performance
5. Dual-Purpose Index
6. Summary

Status of chick culling in Europe

Layer strain

Selection based on egg production, egg quality traits



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Progeny

Fertilized eggs



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Chicks



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Alternative strategies



1. **fattening of males of layer lines**
2. **In-ovo sexing**
3. **dual-purpose poultry**

FR: Article R214-17

- From 1/1/2023 : all hatcheries must be equipped with operational material to avoid the culling of male chicks
-> Special case when it is not possible to comply with the decree

DE: Article TierSchtG Art. 1 § 4c

- From 1/1/2022 : makes it a punishable offence to kill a vertebrate animal "without reasonable cause" (unprofitability) or to cause it suffering and pain

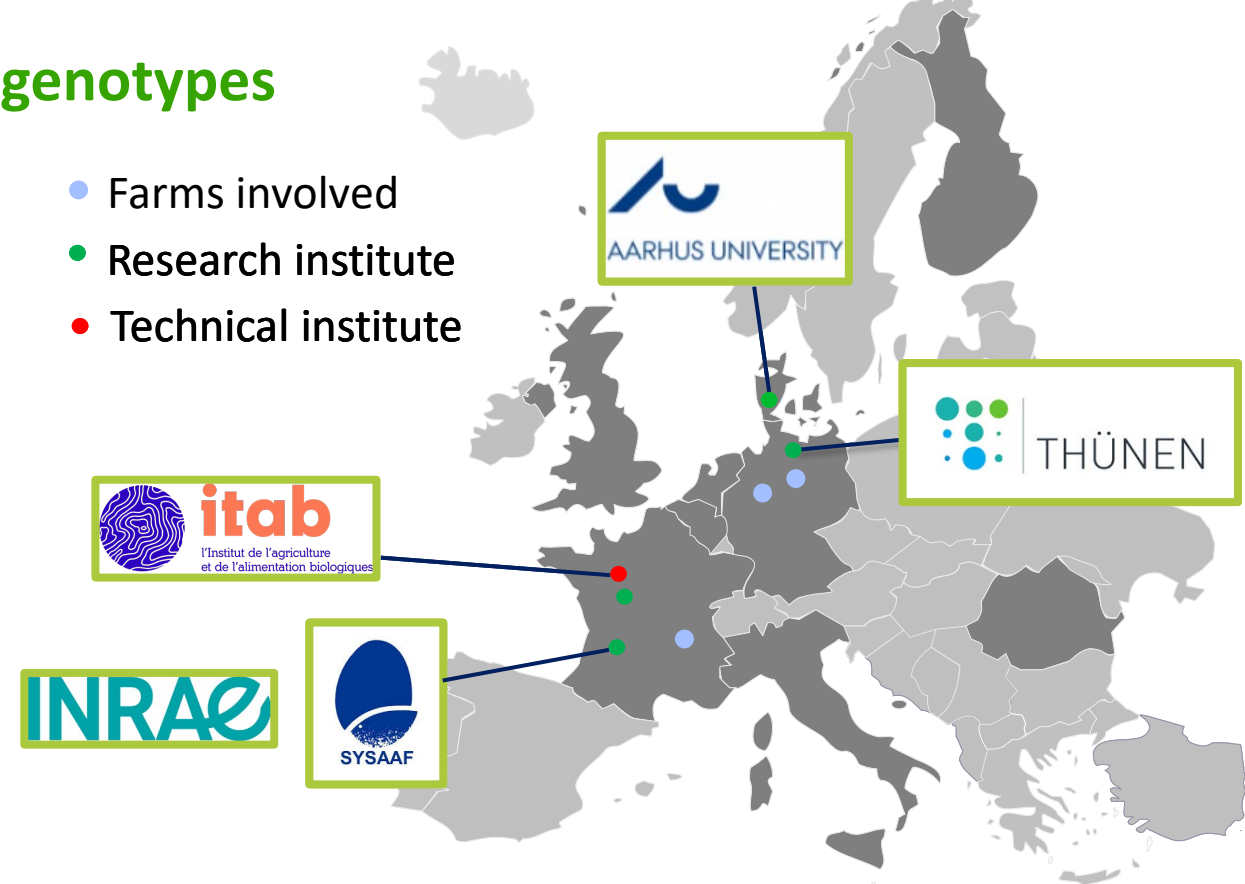
What is dual-purpose poultry?

- To date, only **few scientific** publications on dual-purpose poultry under **experimental and organic conditions** (Torres et al., 2019; Muth et al., 2019; Baldinger and Bussemas, 2021; Tiemann et al., 2020)
 - Available data are less valid than for high-performance hybrids
- **Higher welfare** in dual-purpose poultry (Tiemann et al., 2020; Giersberg et al., 2019; Daş et al., 2021)
- Higher FCR but more **frugal** in nutrient requirements (Urban et al., 2017; Röhe et al., 2019; Kreuzer et al., 2019)
 - **resource-saving diets/optimization** of feeding strategy
- **High robustness** and **adaptability** in free-range and extensive systems (Castellini et al., 2016)
- Term 'dual-purpose poultry' **not defined** (Gebhardt et al., 2023)
- Evaluation of females and males as **unit** not described (Werner et al., 2023; Ibrahim et al., 2019)

PPILOW Partners: trials of dual-purpose genotypes

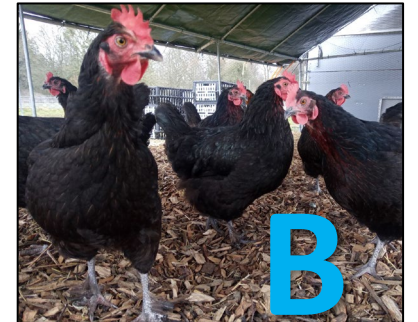
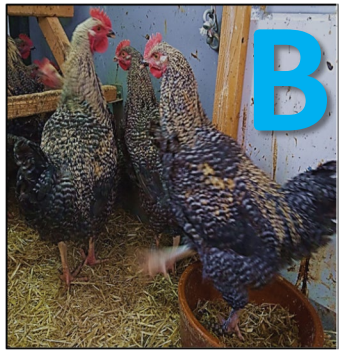
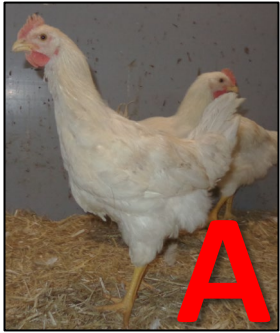
- Cooperation with breeding companies to select **three novel genotypes** suitable as dual-purpose poultry
- On-station trials in three different countries to evaluate **performance, welfare, behaviour and product quality under organic conditions**
- **Economic analysis**
- Close partnership with national practitioner groups to discuss results and select most-promising genotype for **on-farm trials**

- Farms involved
- Research institute
- Technical institute



→ Data presented here refer to the German on-station trials

PPILOW German on-station trials / Materials & Methods



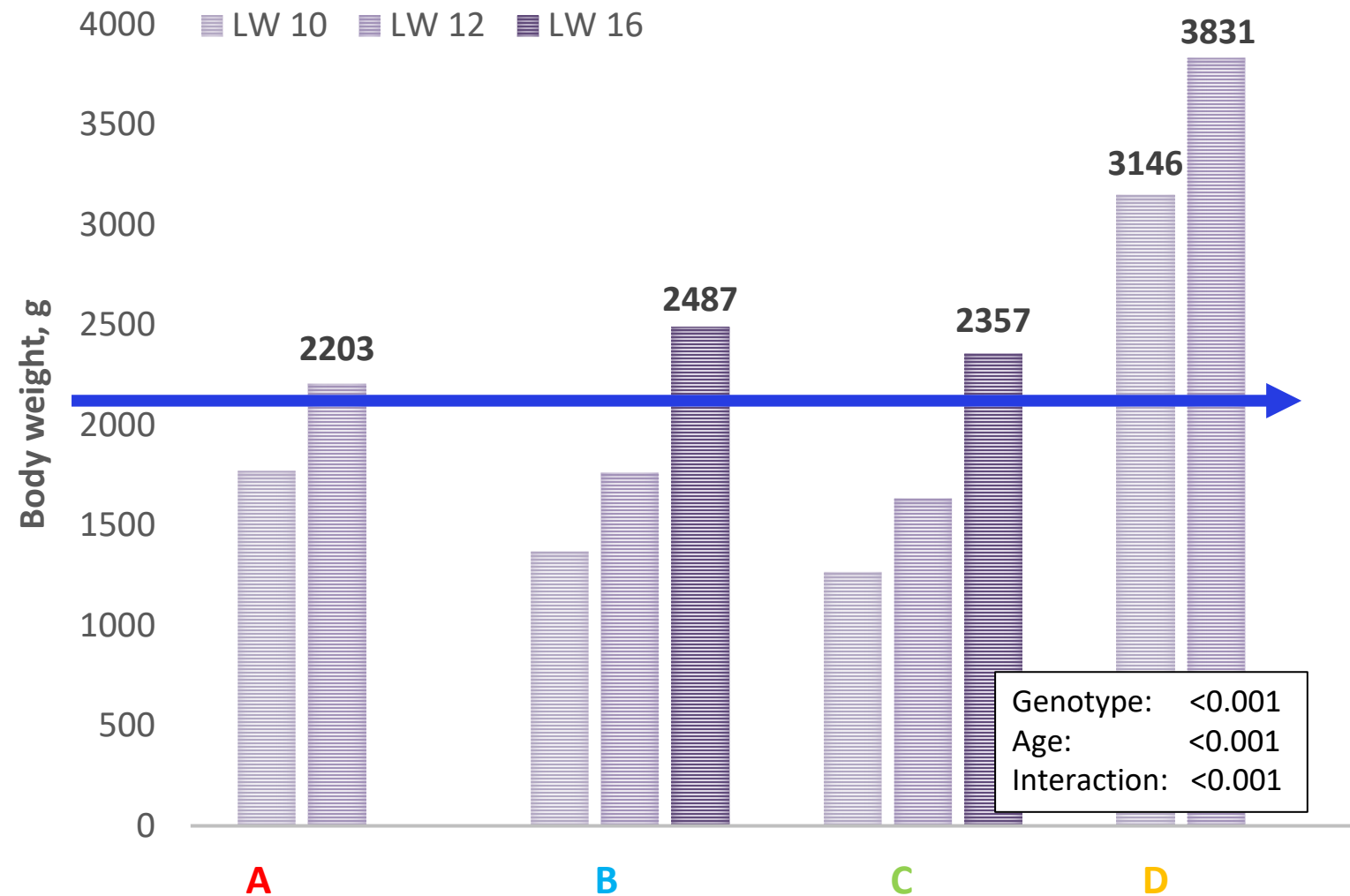
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PPILOW German on-station trials / Results – MEAT

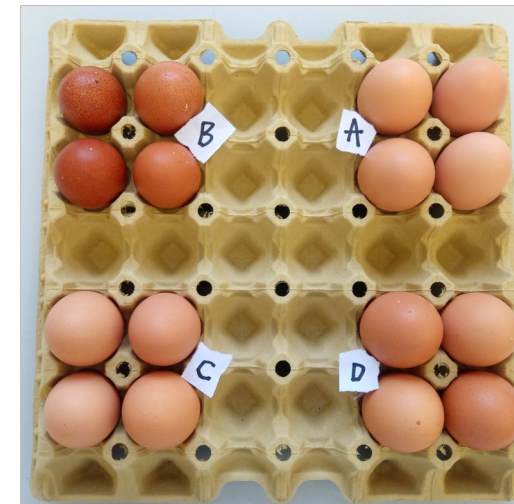
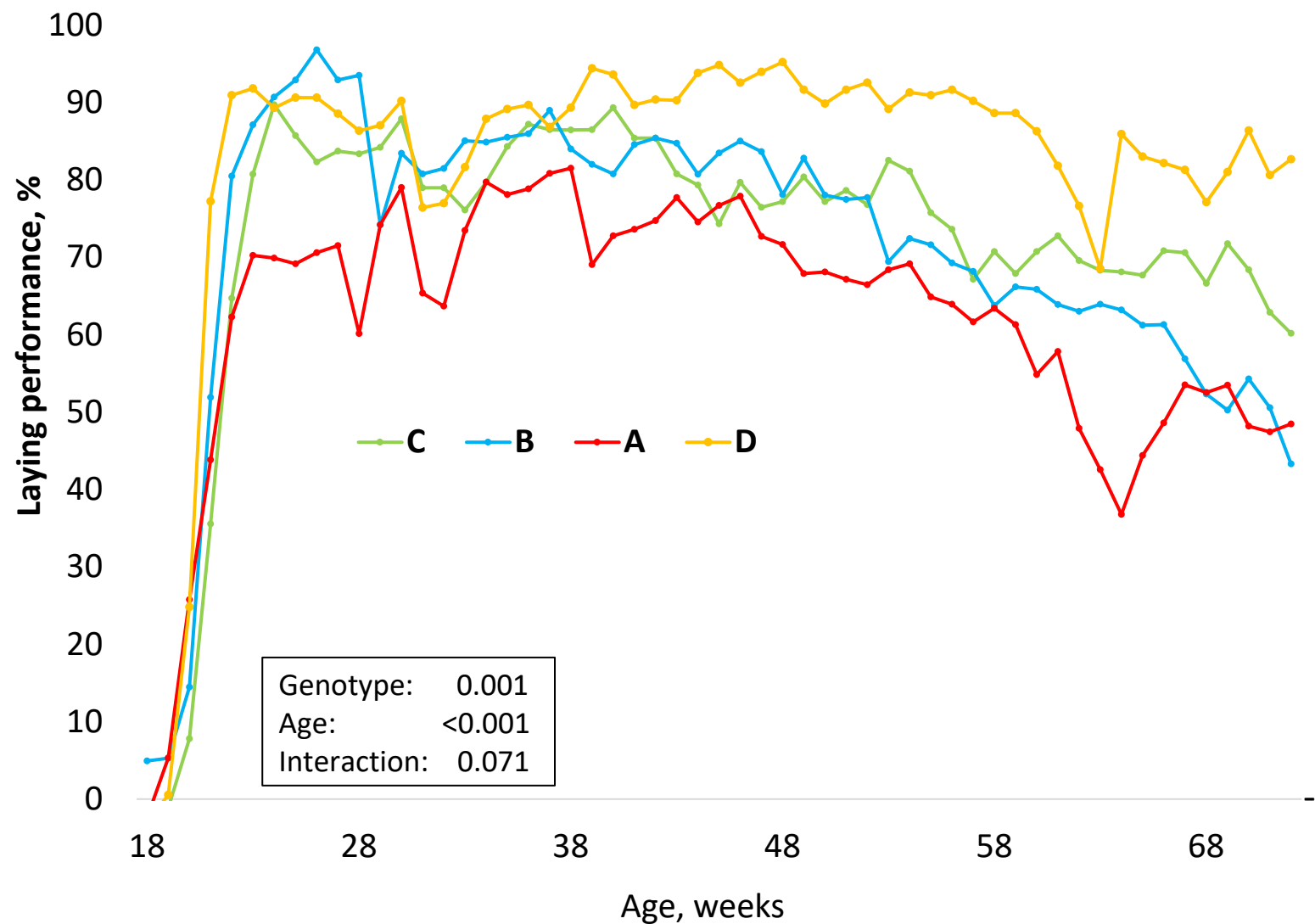


Genotype	Daily weight gain, g d ⁻¹
A	26.1 ^b
B	22.1 ^c
C	21.3 ^c
D	42.9 ^a

- Range in DWG: C < B < A < D
- Slower growth requires longer fattening period to reach target weight



PPILOW German on-station trials / Results – EGGS

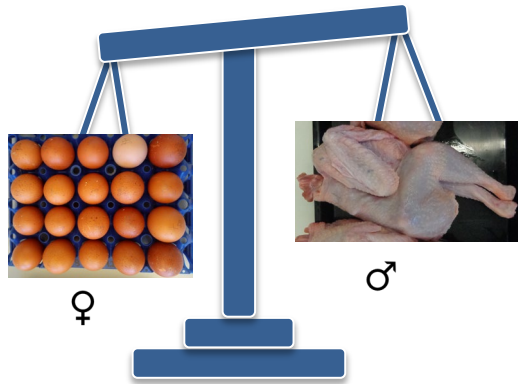


Genotype	Laying performance, %
A	61.8 ^b
B	71.2 ^b
C	72.3 ^{ab}
D	82.9 ^a

Range in laying performance: A < B < C < D

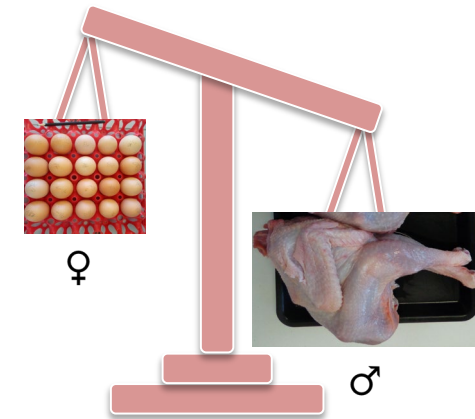
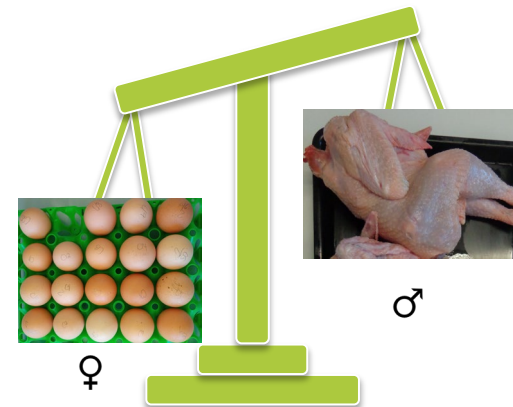
Genotype A:

performance profile of this crossbreed is orientated towards its sire line, emphasised on **meat** and shows higher gains on the male side and lower laying on the female side



Genotype C:

performance profile of this crossbreed is orientated towards its dam line, emphasised on **laying** and shows only slight gains on the male side



Genotype B:

performance profile of this purebreed is orientated more towards egg than meat production

Quantification of dual-purpose performance?



- Joint **economic** evaluation?

ie. 280 eggs x 0.35 € = **98 €** VS 2.5 kg x 1.80 € = **4.50 €**

→ **imbalance** due to level of returns

- Joint **performance** evaluation?

ie. laying performance 82 **%** vs daily weight gain 45 **g d⁻¹**

→ **imbalance** due to different type of data

Quantification of dual-purpose performance

→ Dual-purpose Index (DPI)*

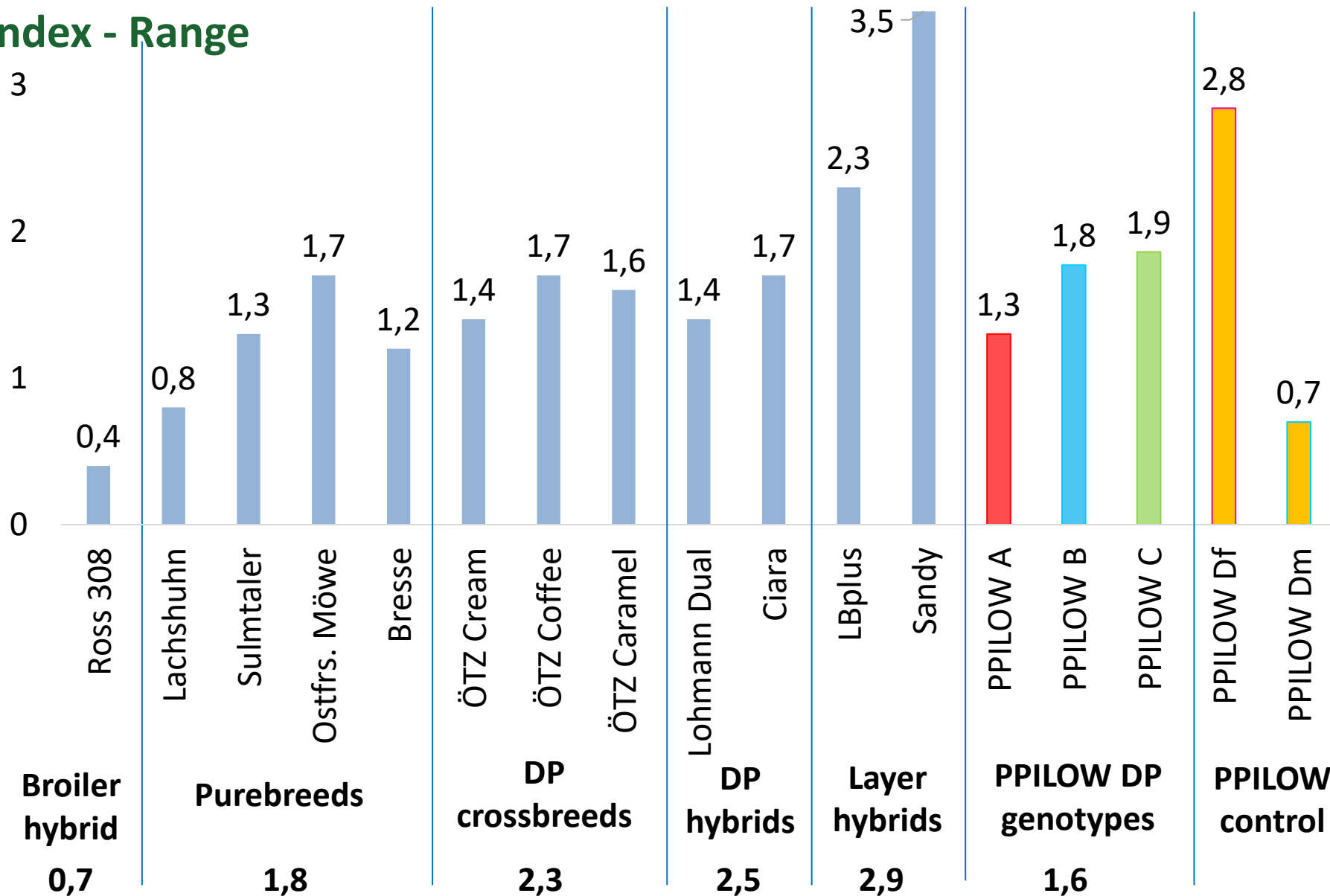
1. Laying performance of the female of a dual-purpose genotype is expressed as a proportion of a commercial layer
2. Daily weight gain of the male of a dual-purpose genotype is expressed as a proportion of a commercial broiler
3. Proportional laying performance is then divided by proportional fattening performance

Genotype	Laying performance, %		Daily weight gain, g d ⁻¹	DPI
A	61.8 / 82.0	:	26.1 / 45.0	1.30
B	71.2 / 82.0	:	22.1 / 45.0	1.77
C	72.3 / 82.0	:	21.3 / 45.0	1.86
D_{female}	82.9 / 82.0	:	16.0 / 45.0	2.84
D_{male}	54.8* / 82.0	:	42.9 / 45.0	0.70

* According to Breeder Management Guide, 40 weeks

Dual-purpose Index - Range

The DPI allows to evaluate male and female as a unit and to better differentiate the suitability.



Source DPI Values: * Hörning, B. (2023) Alternativen in der Hühnerzucht? Aktuelle Entwicklungen bei Bruderhähnen, Zweinutzungshühnern und (Label-) Hähnchen, Plattform Zweinutzungshuhn. Neuland e.V. Haus Düsse, August 24, 2023.

Summary

- Performance of novel dual-purpose poultry genotypes varies depending on genetic selection employed !
- Potential:
 - DPI as coefficient in economic analysis, breeding selection, management decisions etc.
- Limitations:
 - Methods outlined are only a first step in assessing the dual-purpose nature of poultry genotypes
 - No limits have yet been set: 'dual-purpose' needs to be defined more precisely
 - Clear distinction between single-purpose and dual-purpose use
- DPI is a contribution to ongoing discussion on definition of dual-purpose poultry
- Further research is needed to optimize the management of dual-purpose poultry



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Thank you for your attention!

For more information, check out www.ppilow.eu

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