The biodiversity of local poultry breeds: characterisation of two Tuscany breeds to save them from extinction

Federica Mannelli[a], Ilaria Galigani[a], Luca Versino[a], Marcenette Biagi Arroyo[a], Leonardo Fantechi[a], Matteo Daghio[a]

[a]Department of Scienze e Tecnologie Agrarie, Alimentari, Ambientali e Forestali, University of Florence, Florence, 50144, Italy

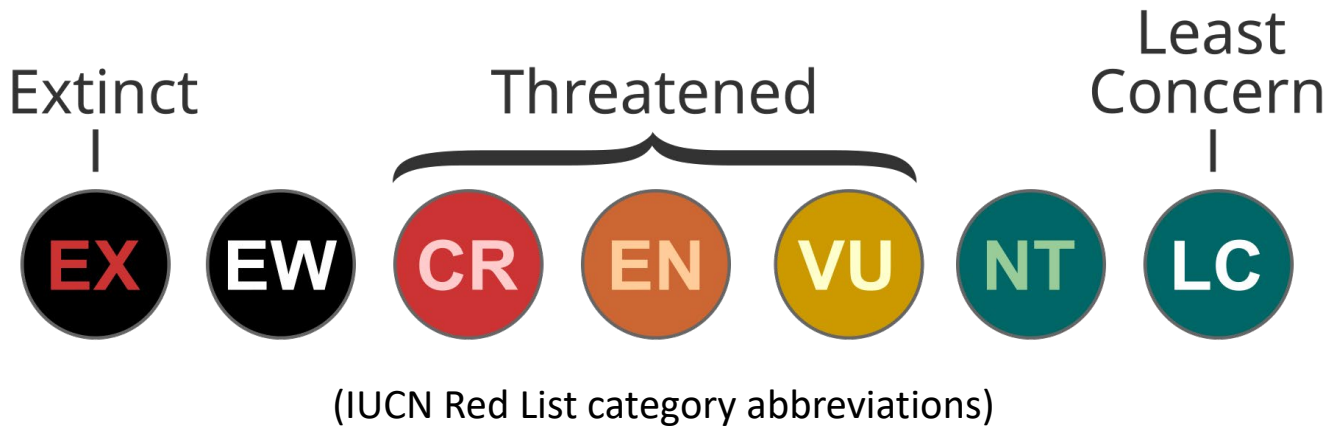
RELATOR: Federica Mannelli

federica.mannelli@unifi.it

TUTELA BIODIVERSITÀ AVICOLA ITALIANA

UNIVERSITÀ DEGLI STUDI FIRENZE
DAGRI
DIPARTIMENTO DI SCIENZE E TECNOLOGIE AGRARIE, ALIMENTARI, AMBIENTALI E FORESTALI

Background



(IUCN Red List category abbreviations)

The safeguarding and valorization of animal genetic resources (AnGR) for food and agriculture contribute toward the preservation of animal biodiversity against climate change and support local farm livelihoods and the sustainability of animal productions

"Phenotypic characterization of animal genetic resources (AnGR) is the process of identifying distinct breed populations and describing their external and production characteristics in a given environment and under given management, taking into account the social and economic factors that affect them" (FAO, 2012)

Background

PRIORITY LEVELS OF IMPLEMENTATION OF THE STRATEGIC PRIORITIES (SPS) OF THE GLOBAL PLAN OF ACTION

	STRATEGIC PRIORITY AREA 1 CHARACTERIZATION, INVENTORY AND MONITORING OF TRENDS AND ASSOCIATED RISKS	STRATEGIC PRIORITY AREA 2 SUSTAINABLE USE AND DEVELOPMENT	STRATEGIC PRIORITY AREA 3 CONSERVATION	STRATEGIC PRIORITY AREA 4 POLICIES, INSTITUTIONS AND CAPACITY BUILDING
NATIONAL	**SP 1** Inventory and characterize AnGR, monitor trends and risks associated with them, and establish country-based early-warning and response systems	**SP 3** Establish and strengthen national sustainable use policies **SP 4** Establish national species and breed development strategies and programmes **SP 5** Promote agro-ecosystems approaches to the management of AnGR **SP 6** Support indigenous and local production systems and associated knowledge systems of importance to the maintenance and sustainable use of AnGR	**SP 7** Establish national conservation policies **SP 8** Establish or strengthen in situ conservation programmes **SP 9** Establish or strengthen ex situ conservation programmes	**SP 12** Establish or strengthen national institutions, including national focal points, for planning and implementing AnGR measures, for livestock sector development **SP 13** Establish or strengthen national educational and research facilities **SP 14** Strengthen national human capacity for characterization, inventory, and monitoring of trends and associated risks, for sustainable use and development, and for conservation **SP 18** Raise national awareness of the roles & values of AnGR **SP 20** Review and develop national policies and legal frameworks for AnGR
REGIONAL			**SP 10** Develop and implement regional and global long-term conservation strategies	**SP 17** Establish Regional Focal Points and strengthen international networks

The first step of the FAO Global Plan of Action is the inventory and characterization of national AnGR

In this context was set up the TuBAvI project to carry on the conservation of biodiversity in Italian poultry breeds

(Ministry of agriculture, food sovereignty and forestry – National Rural Development Programme 2014/2022 – Measure 10.2 – Conservation, use and sustainable development of genetic resources in agriculture. A collective project within the poultry sector funded with the support of the European Agricultural Fund for Rural Development (EAFRD))

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TuBAvI (2017-2020) and TuBAvI-2 (2021-2024) projects

- Surveys on local farmers
- Animal characterization
- Rearing management and feeding strategies set up
- Mating plans
- Counceling, support and formation programs for farmers

Regional germplasm bank for two Tuscany poultry breeds: Mugellese and Valdarnese bianca

Breeds

The Mugellese chicken is a **brachimorphic breed** with a medium neck, broad shoulders, long and horizontal wings, wide, and well-developed breast (especially in the hen) with a typical brooding capacity

The Valdarnese Bianca breed is a **dolicomorphic breed** considered the only original Italian meat-type breed of the national genetic heritage with a long neck, broad shoulders, long and horizontal wings, and long legs and shanks

Both these breeds show frugality, resilience and resistance to diseases and are particularly suitable for free-range farming

Aim

Over the course of a 1-yr observation, these two breeds were characterized for morphological, productive and reproductive traits and at the end of the trial, for caecal microbial community profile

Experimental design for growth evaluation (7-140 days)

60 chickens

Mugellese

30 chicken (15 male + 15 female)

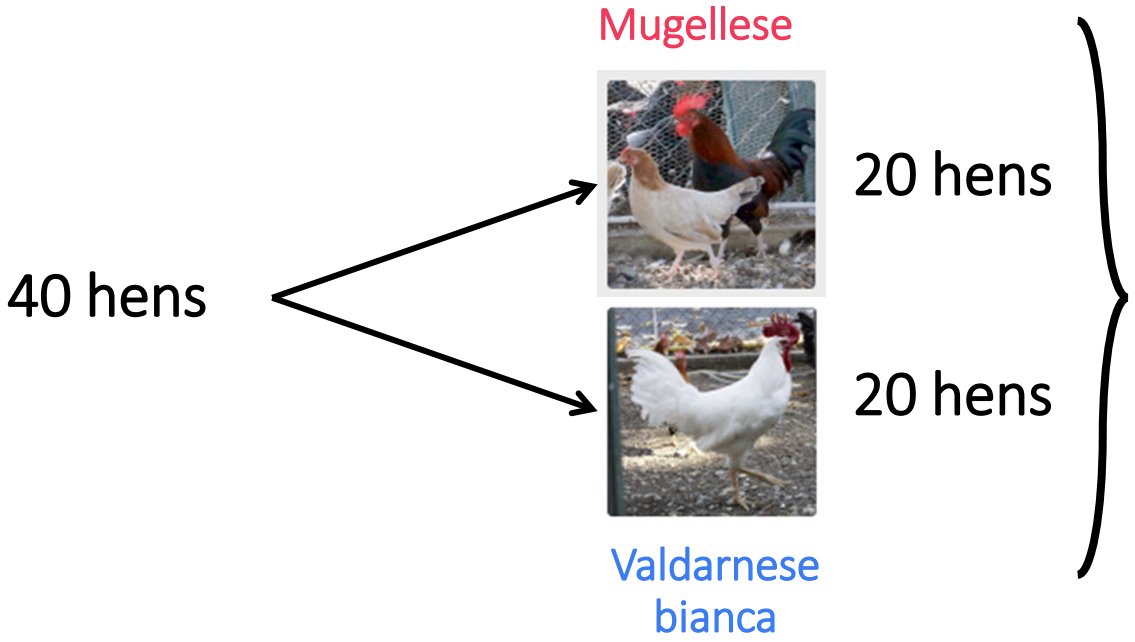
Valdarnese bianca

30 chicken (15 male + 15 female)

- Animal growth
- Morpho-functional traits growth (body length, chest circumference, wing span, shanks length)

(FAO, 2012 protocol)

Experimental design for deposition evaluation (365 days)



- Evaluation of the deposition curve based on the calculated HDP% (hen-day production %)

(FAO, 2012 protocol)

Experimental design for microbial community profile evaluation

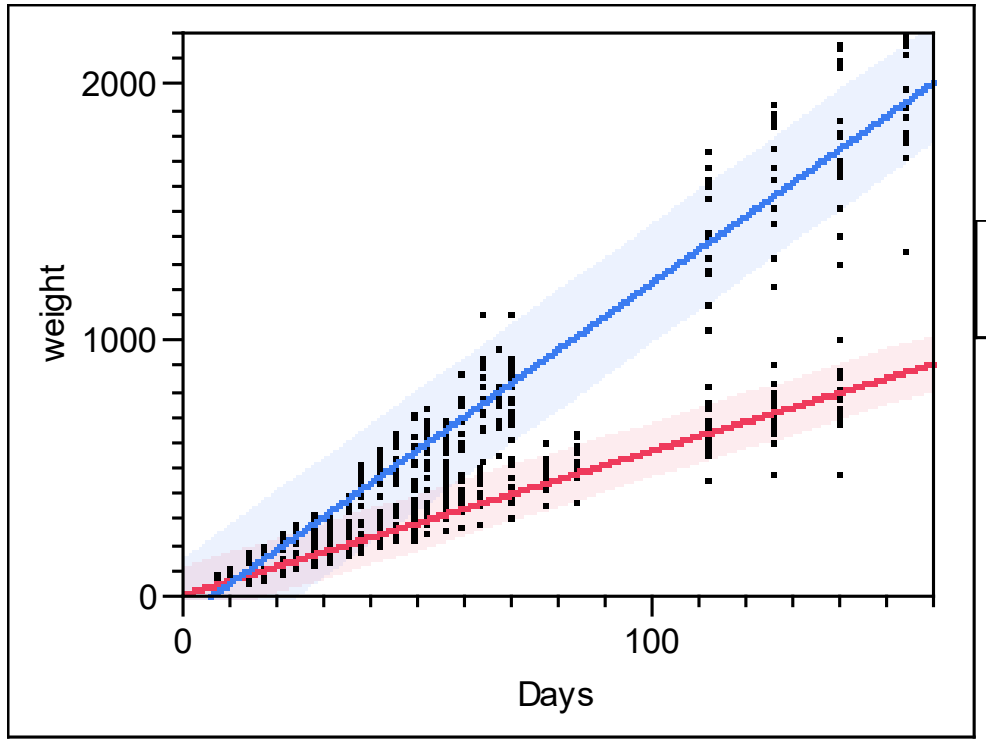
At the end of the 1st trial (150° day) caecal feaces were sampled

- Microbial community profile

Animal growth – body weight

Mugellese

Valdarnese bianca



$R^2 = 0.929057$

$y = 15.08877 + 5.6520764x$

$R^2 = 0.952177$

$y = -70.38167 + 13.034125x$

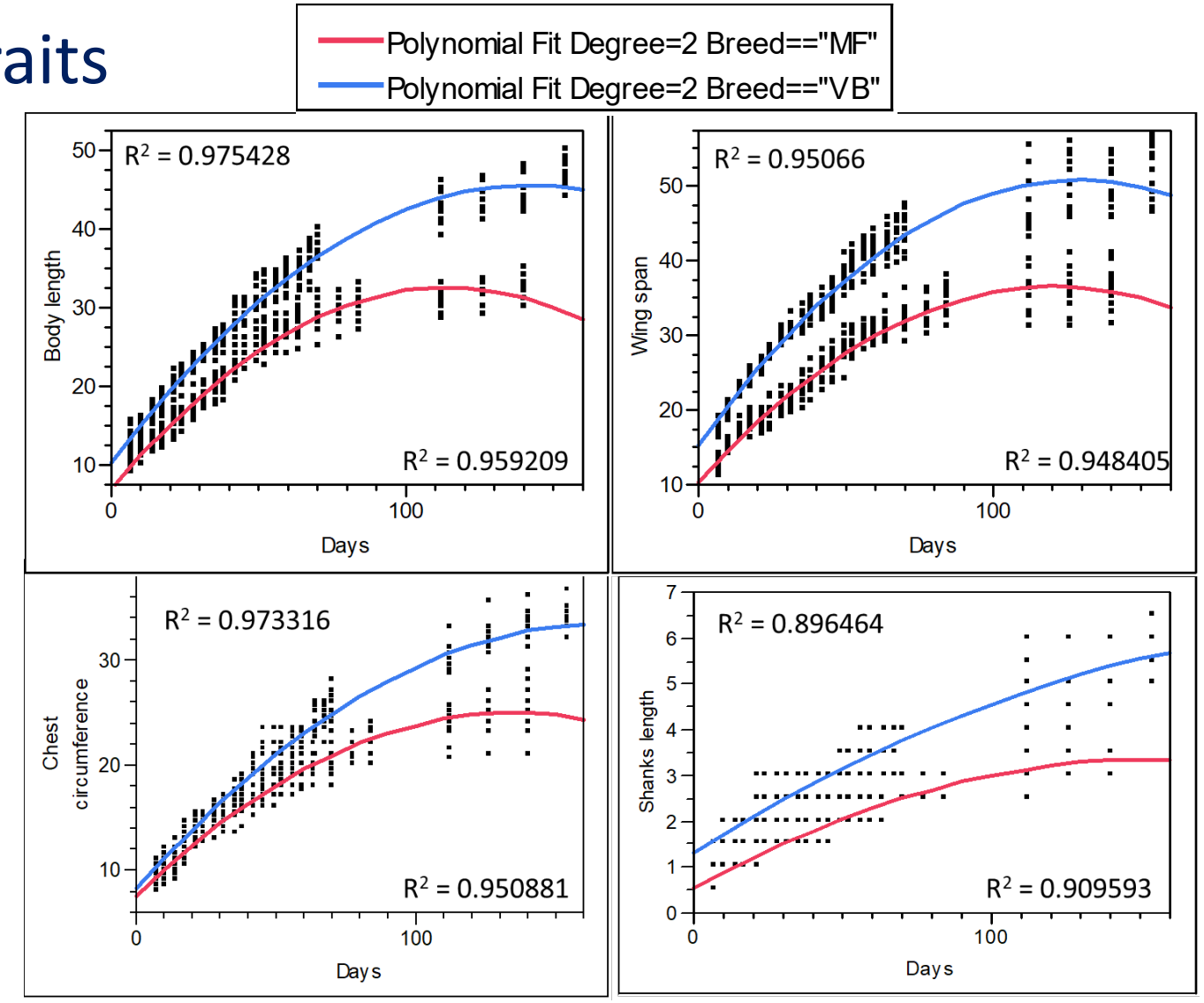
Growth rate was observed different between the two breeds

Animal growth – body main traits

Mugellese

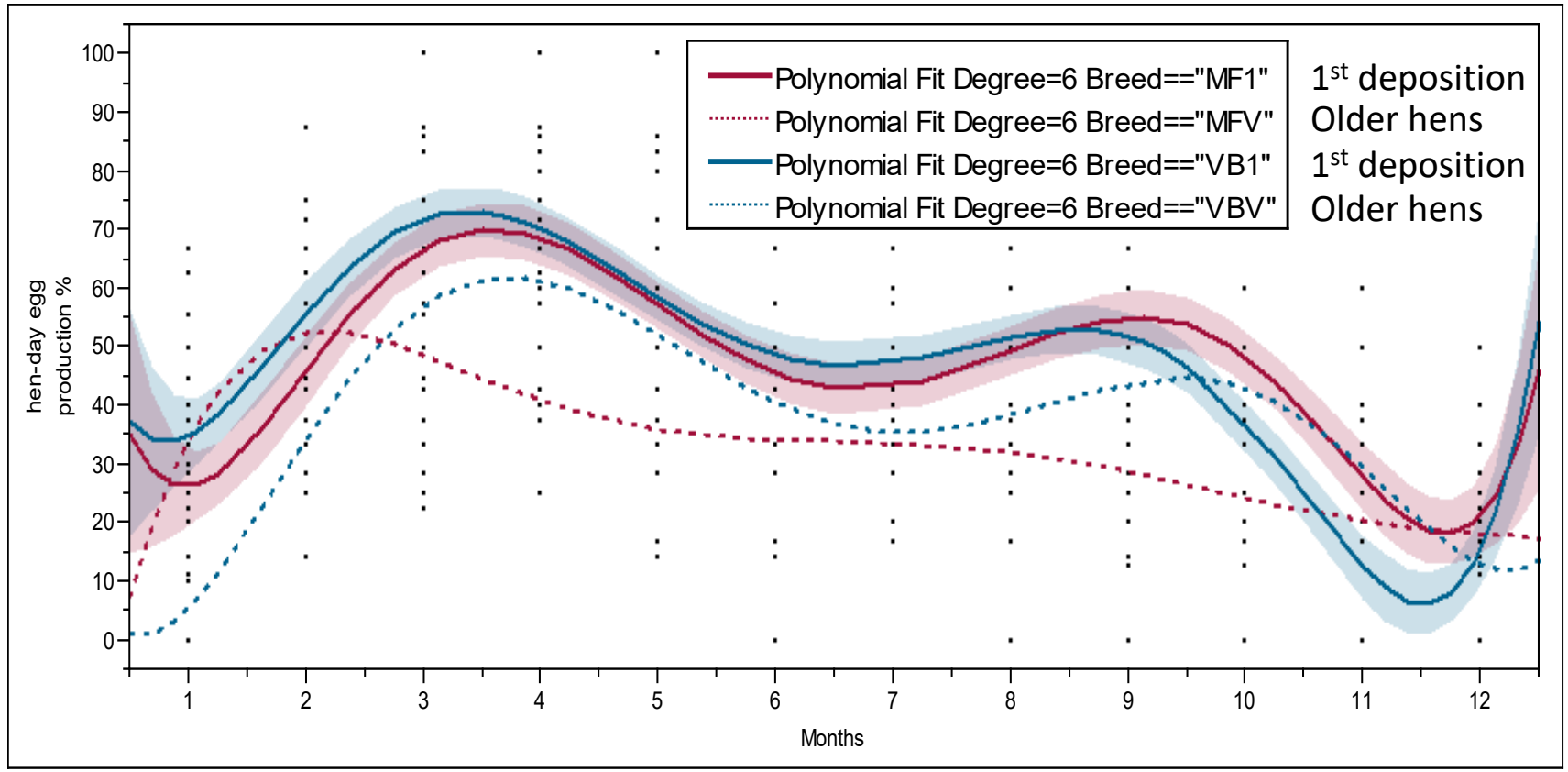
Valdarnese bianca

The difference in the growth rate reflected also on body main traits



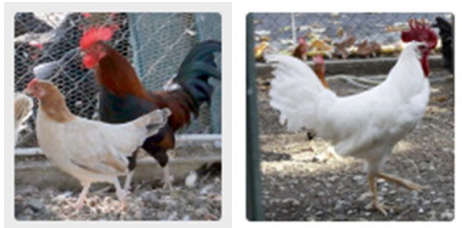
Egg laying

HDP% curve was similar between the two breeds for the 1st year of deposition but they differ most when older hens were considered



R^2 = 0.387630

R^2 = 0.377904



Mugellese

Valdarnese bianca

R^2 = 0.521544

R^2 = 0.533766

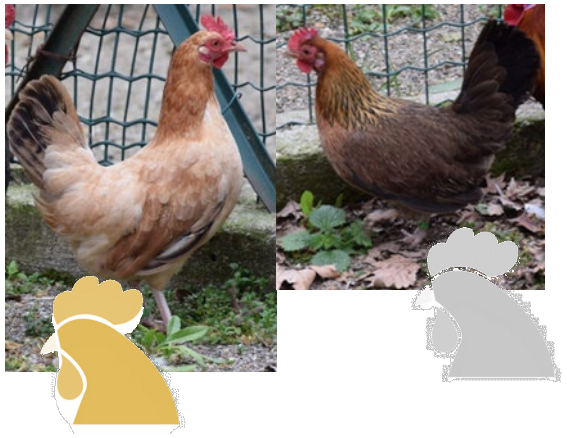
Ceacal microbiota

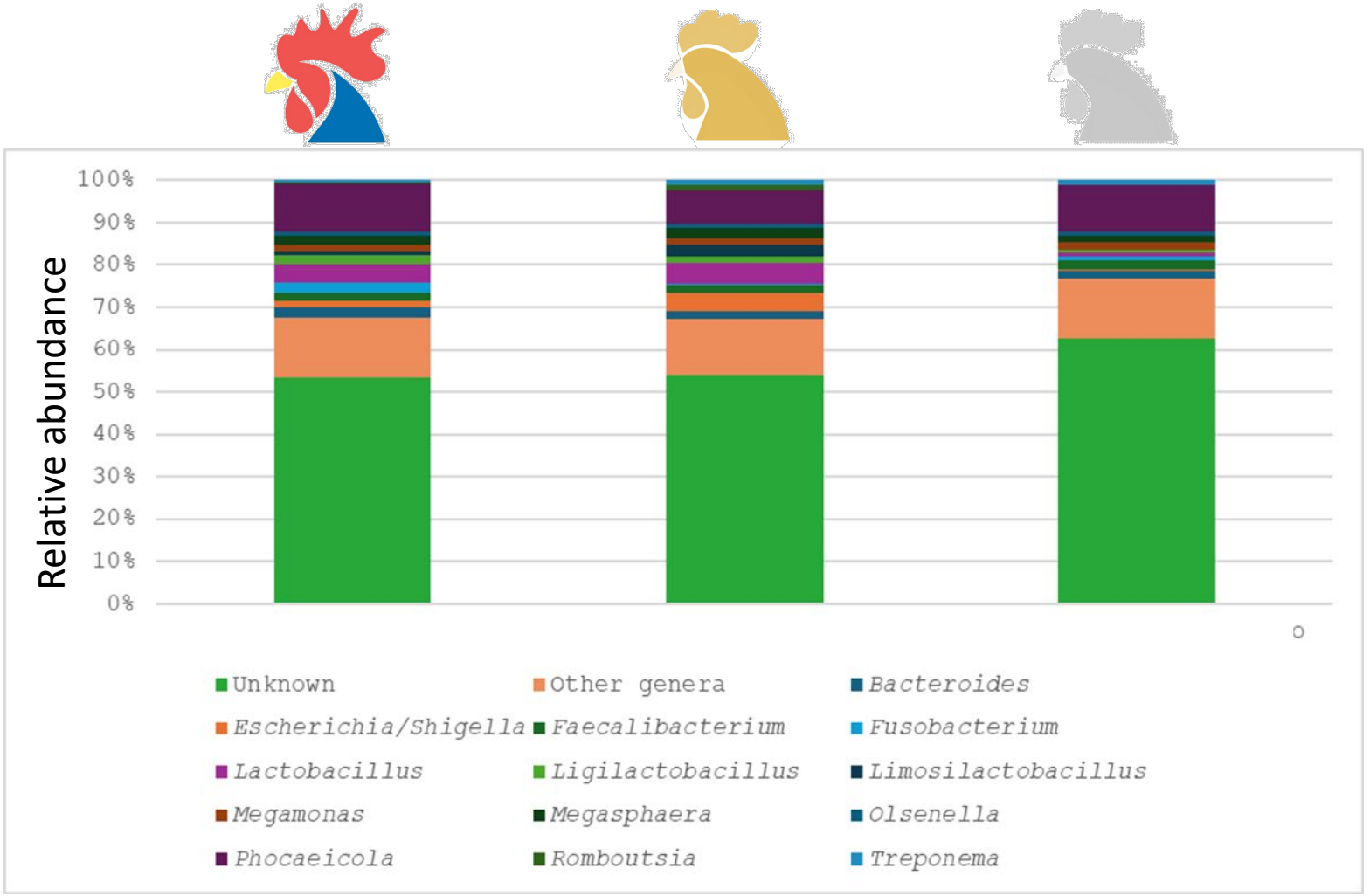
Mugellese

Valdarnese bianca

Golden wheat type

Wild type





Ceacal microbial community of Mugellese wheat type found more similar with Valdarnese Bianca than to the Mugellese wild type

Conclusions

As aspected

- Comparing the **growth** of a brachimorphic type with a dolicomorphic one lead to different rate of growth

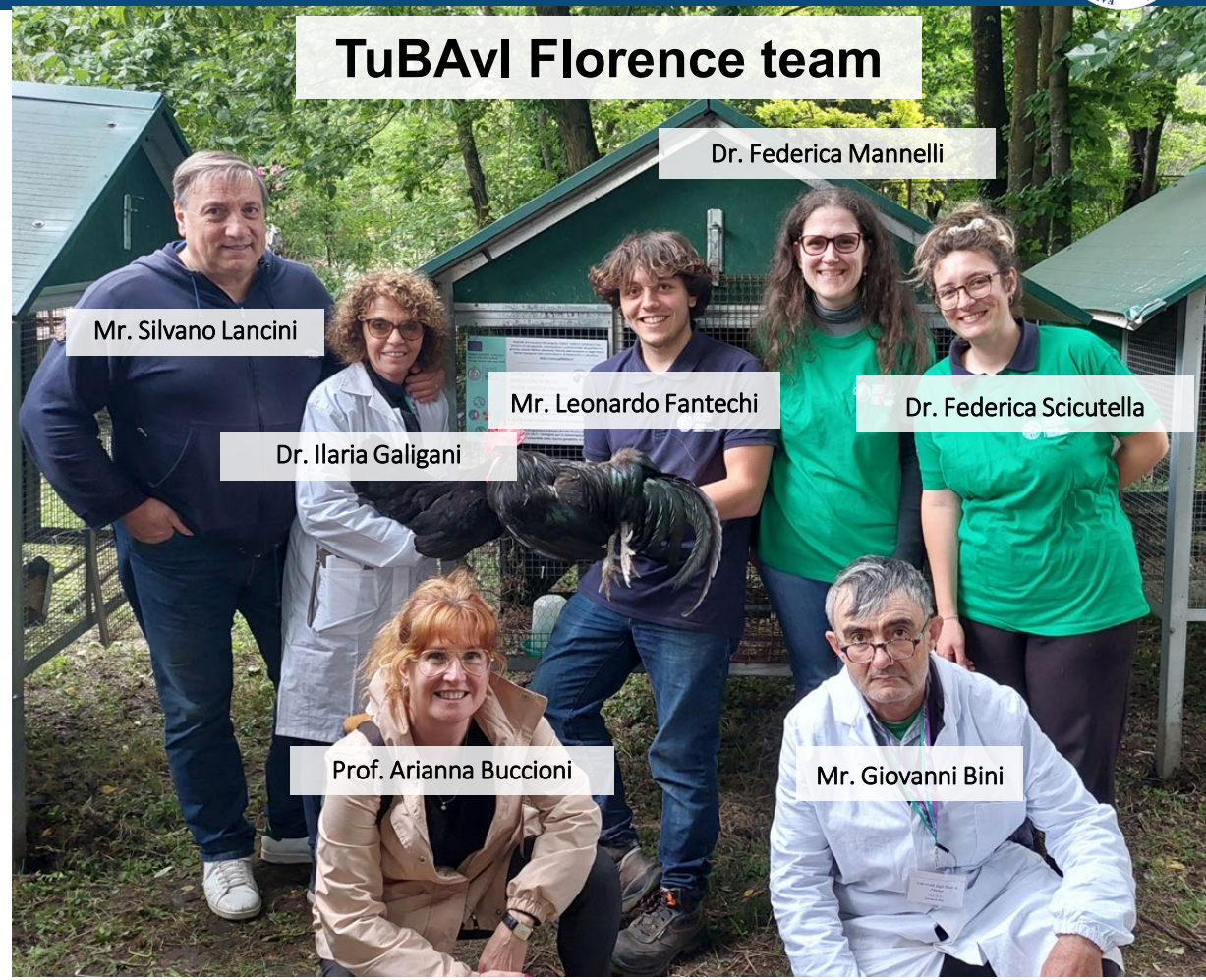
and

- The **laying curve** differ only comparing hens in the 1st year of deposition with older hens

Instead, completely unespected

- Ceacal microbiota community were more similar between Valdarnese bianca and Mugellese wheat type than between the two Mugellese types

Thank you



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