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A mating scheme based on molecular parentage improves growth performance in slow-growing chickens over three generations

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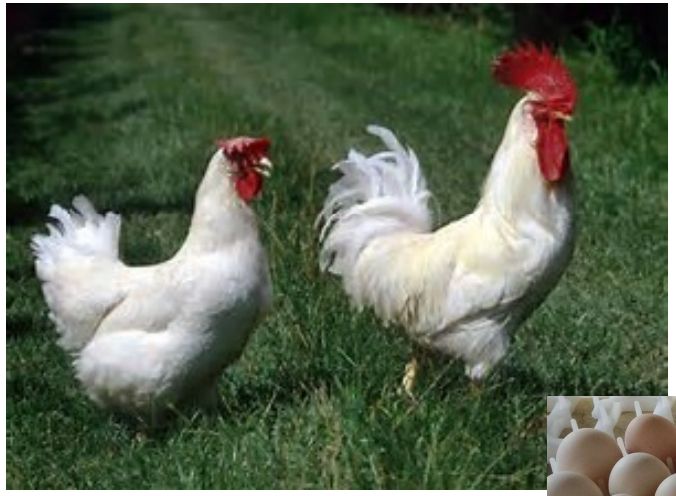
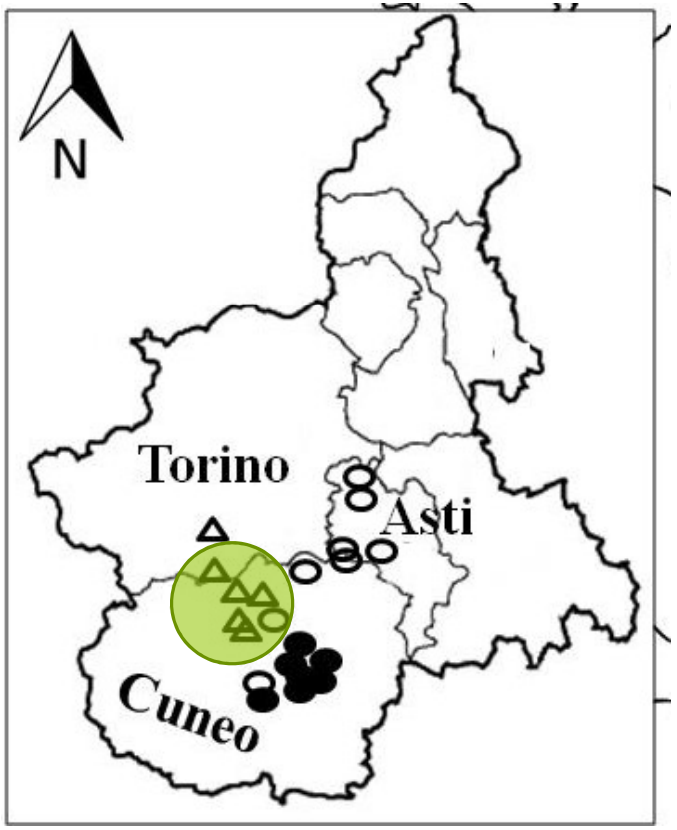
The objectives of this study were

1) minimize progeny inbreeding using a mating scheme base on molecular information
2) evaluate effects on growth performance in slow growing chickens

A pilot study in Bianca di Saluzzo Italian chicken breed

Bianca di Saluzzo





How to minimize progeny inbreeding?

- Optimal Contribution (OC) method
- Selected breeders for their variability contribution
- outbreeding mating scheme (pedigree)

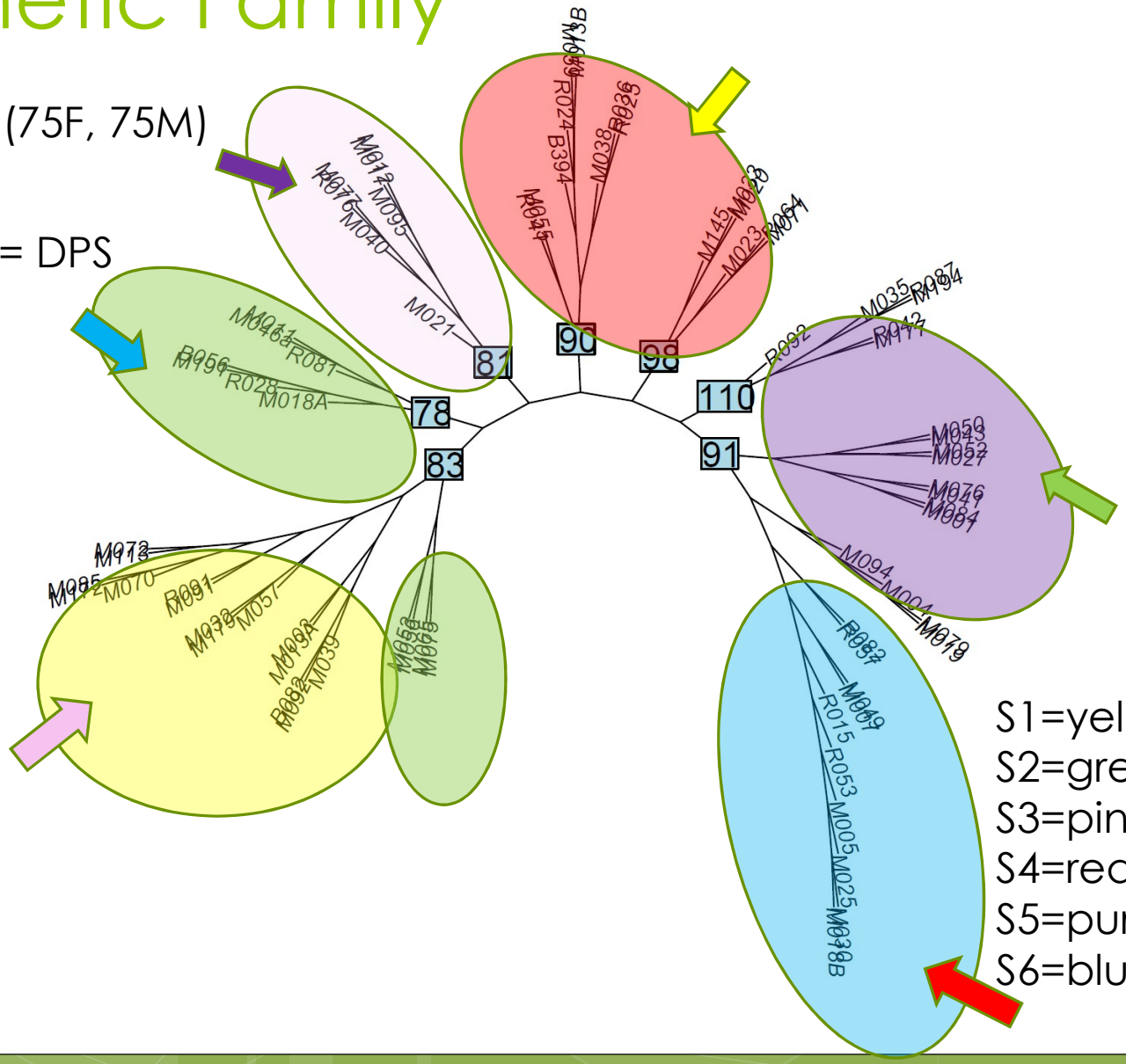
DNA Microsatellite Markers

300 DNA from feathers/14 microsatellite markers

Genetic Family

G =150 (75F, 75M)

Genetic distance= DPS



G

- S1=8F + **MS3**
- S2=7F +MS6
- S3=7F + MS5
- S4=9 +MS1
- S5=7 +MS2
- S6=10 +MS4

G1(offspring)

- S1=10F + MS6
- S2=10F + **MS3**
- S3=10F + MS4
- S4=10F + MS2
- S5=10F + MS5
- S6=10F + MS1

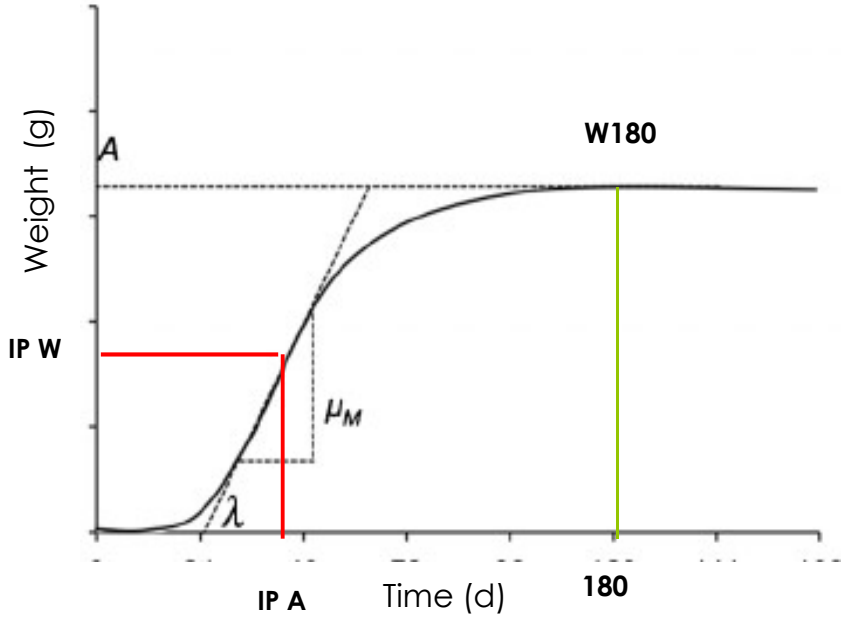
G2(offspring)

- S1=10F + MS5
- S2=10F + MS4
- S3=10F + MS2
- S4=10F + MS6
- S5=10F + MS1
- S6=10F + **MS3**

Body Weight and Grompertz linear model

440 individuals of three generations (G, G1 and G2) were weighted every 15 days from hatch to6 months of age

μ=Daily growth rate
IP= Inflection Point (Age and Weight)
180W= final Body Weight



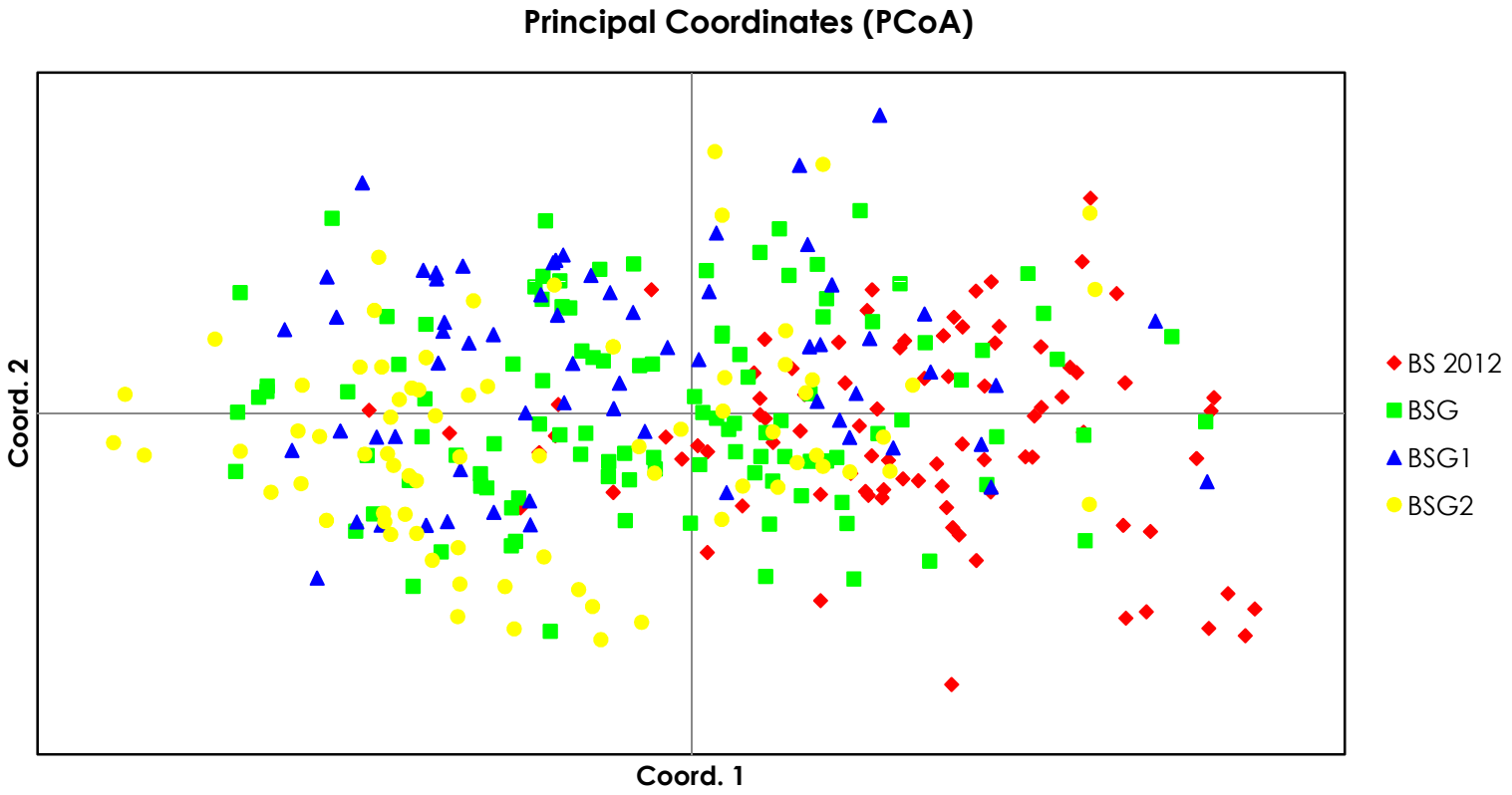
GENETIC VARIABILITY

Mean over Loci for each Pop

Pop		Na	Ne	Ho	He	F
BSG0	**Mean**	9	4	0,68	0,68	0,01
BSG1	**Mean**	7	4	0,69	0,68	-0,03
BSG2	**Mean**	6	4	0,68	0,68	-0,01

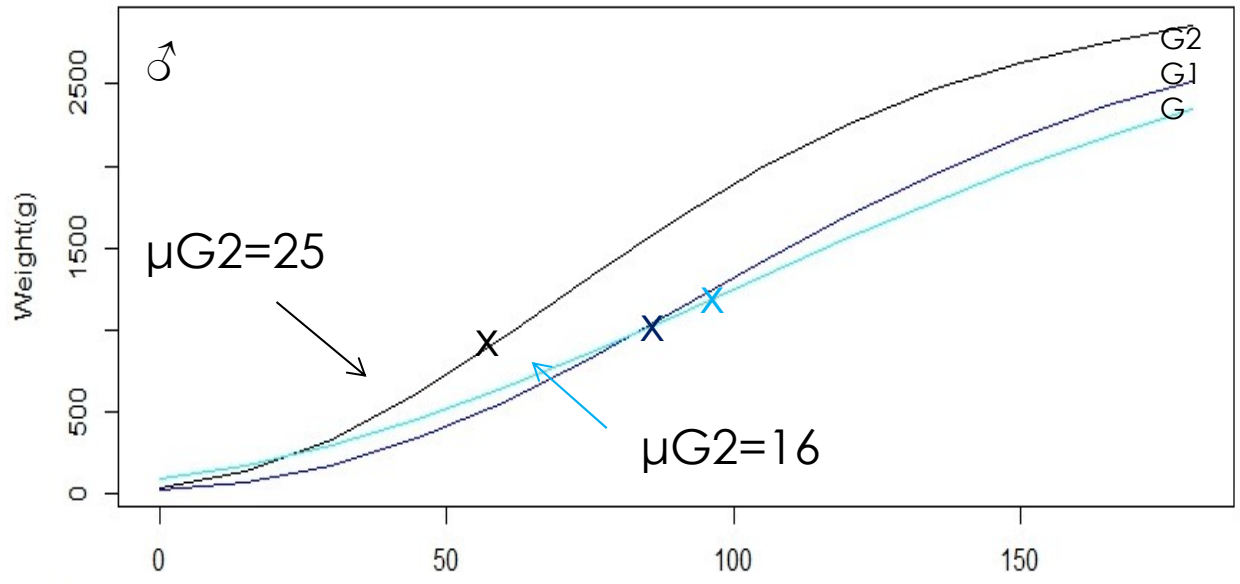
Ne=(1 / (Sum pi^2)),
F =(1 - (Ho / He))

GENETIC VARIABILITY

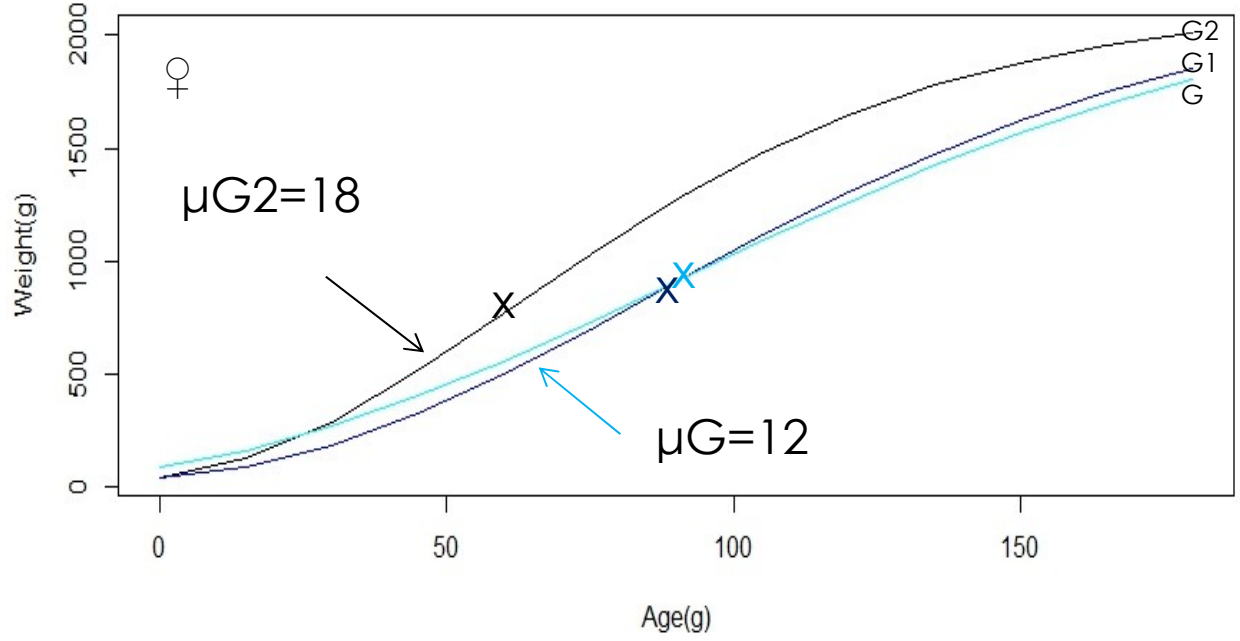


Kinship

	G	G1	G2
S1	0,37	**0,49**	**0,46**
S2	0,26	**0,47**	0,39
S3	0,40	0,42	0,39
S4	0,41	0,40	0,41
S5	0,35	0,38	0,37
S6	0,38	0,28	0,37
Family Mean	**0,36**	**0,41**	**0,40**
Population Mean	**0,42**	**0,43**	**0,41**


♂
G2
G1
G
μG2=25
μG2=16
Weight(g)
0
500
1500
2500
0
50
100
150

+500gr


♀
G2
G1
G
μG2=18
μG=12
Weight(g)
0
500
1000
1500
2000
0
50
100
150
Age(g)

+250gr

Conclusions

- Genetic variability preserved
- kinship minimized
- Growth performance improved

Use of **molecular parentage** in mating schemes could be a sound tool for management of small chicken populations and improvement of their performance

Thank you for your attention!!!

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