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Tropical Livestock  
Genetics and Health

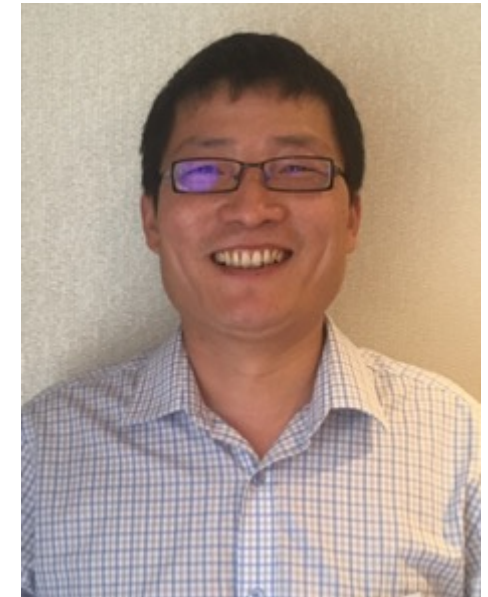
# Ex situ conservation of indigenous poultry diversity: the way forward

Mike McGrew  
Jun Hu





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Jun Hu



Bruce Whitelaw



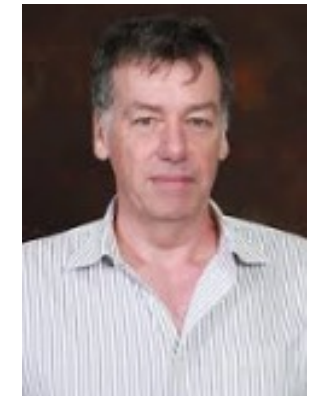
Nakami Wilkister



Christian Tiambo



Maeve Ballantyne



Steve Kemp



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BILL & MELINDA  
GATES *foundation*



COBB-VANTRESS



Innovate UK



National Centre  
for the Replacement  
Refinement & Reduction  
of Animals in Research





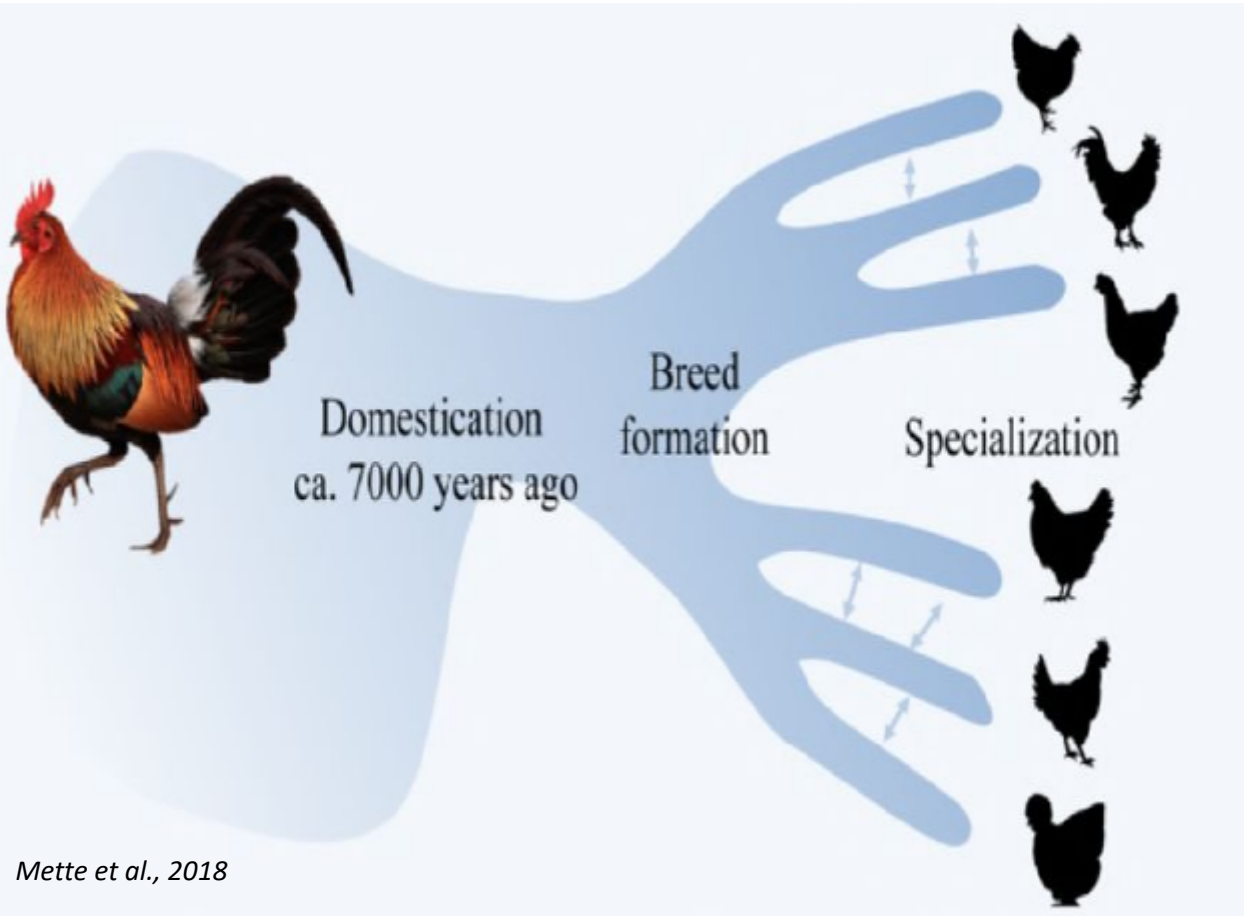
# Local 'breeds' of chicken

Helping to provide more productive chicken for African small holder farmers by *safeguarding genetic diversity*





# The state of poultry biodiversity in Africa



**129** African chicken breeds

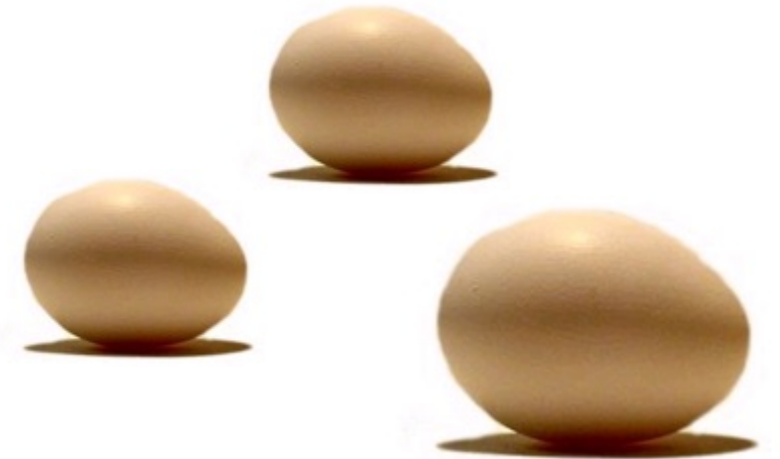
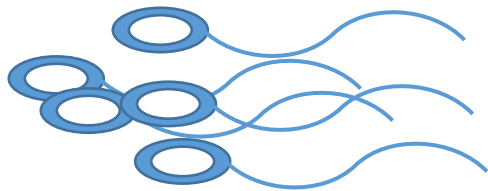
(DAD-IS, July 2014)

from Christian Tiambo



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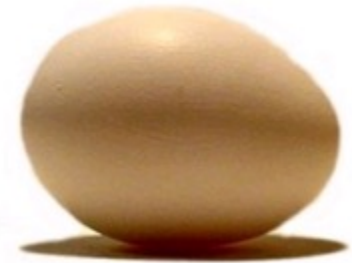
# Cryopreservation (and revival) of bird species is difficult







# Chick germ cells (PGCs)



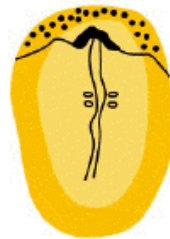
blastodisc  
(**50** PGCs)



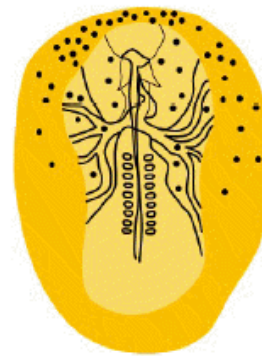
area pellucida



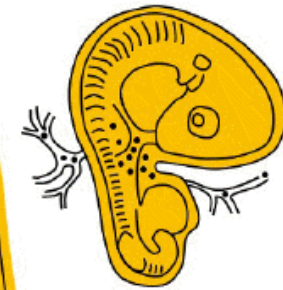
germinal  
crescent



entrance into  
extra-embryonic  
blood vessels



transfer by extra- and intra- embryonic blood stream

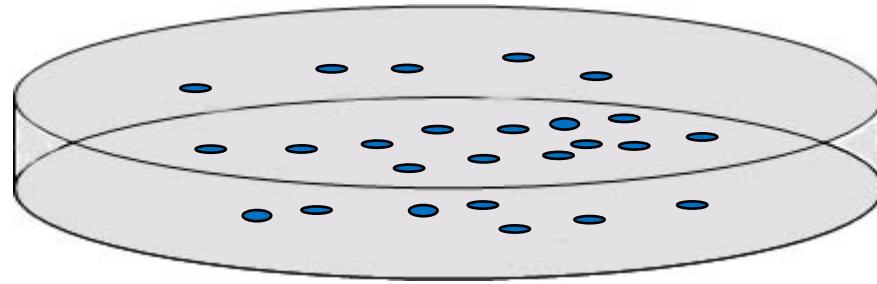
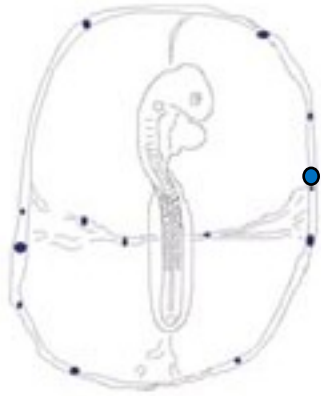


embryonic gonads  
> **10,000** PGCs

Colonization of gonadal anlagen

Lee, et al., 2015, Mol. Cells Vol.

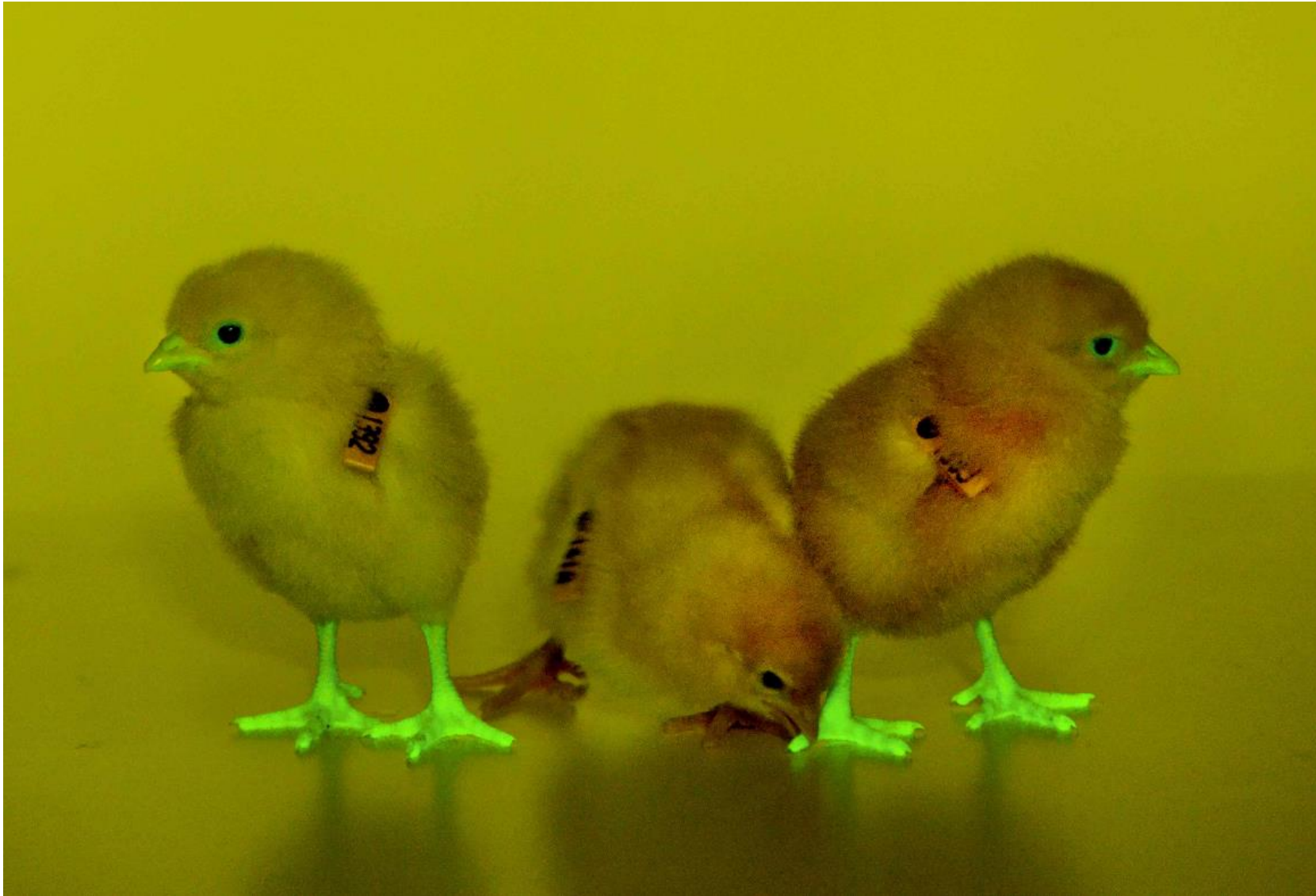
# Biobanking using primordial germ cells (PGCs)



Defined culture medium

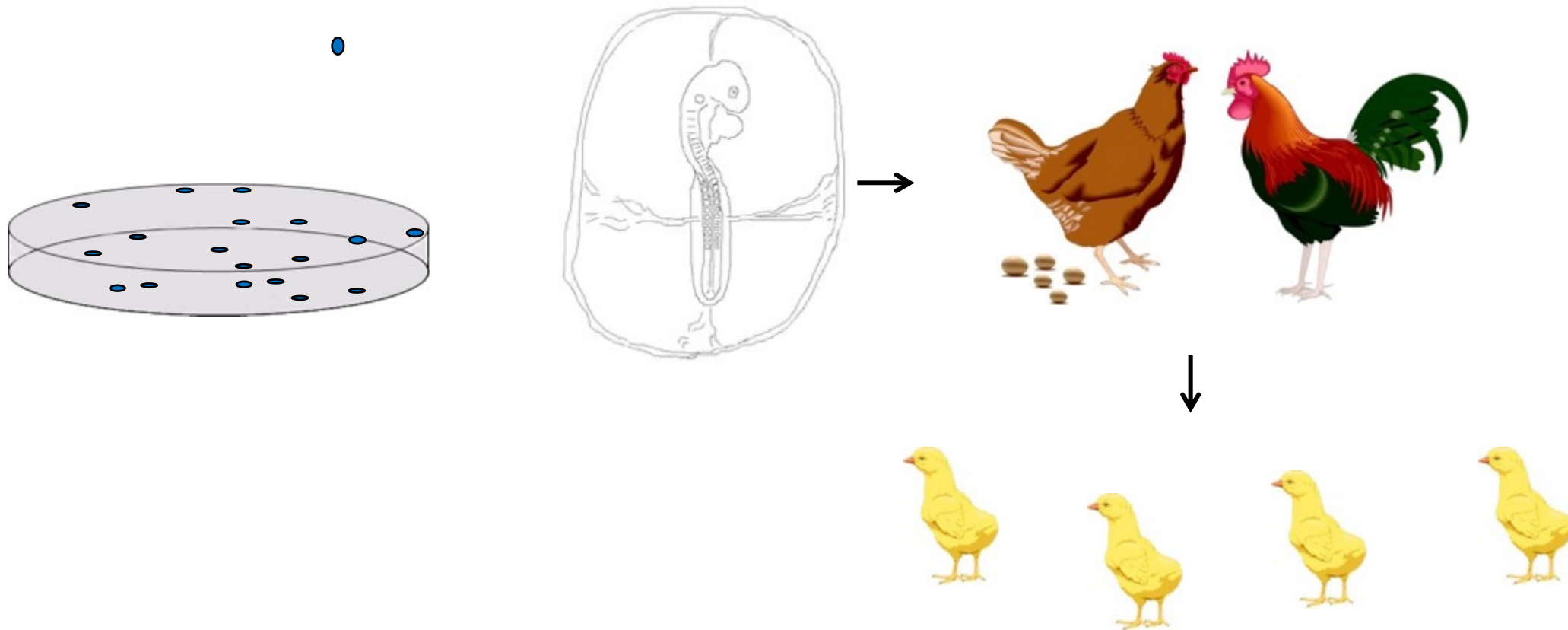






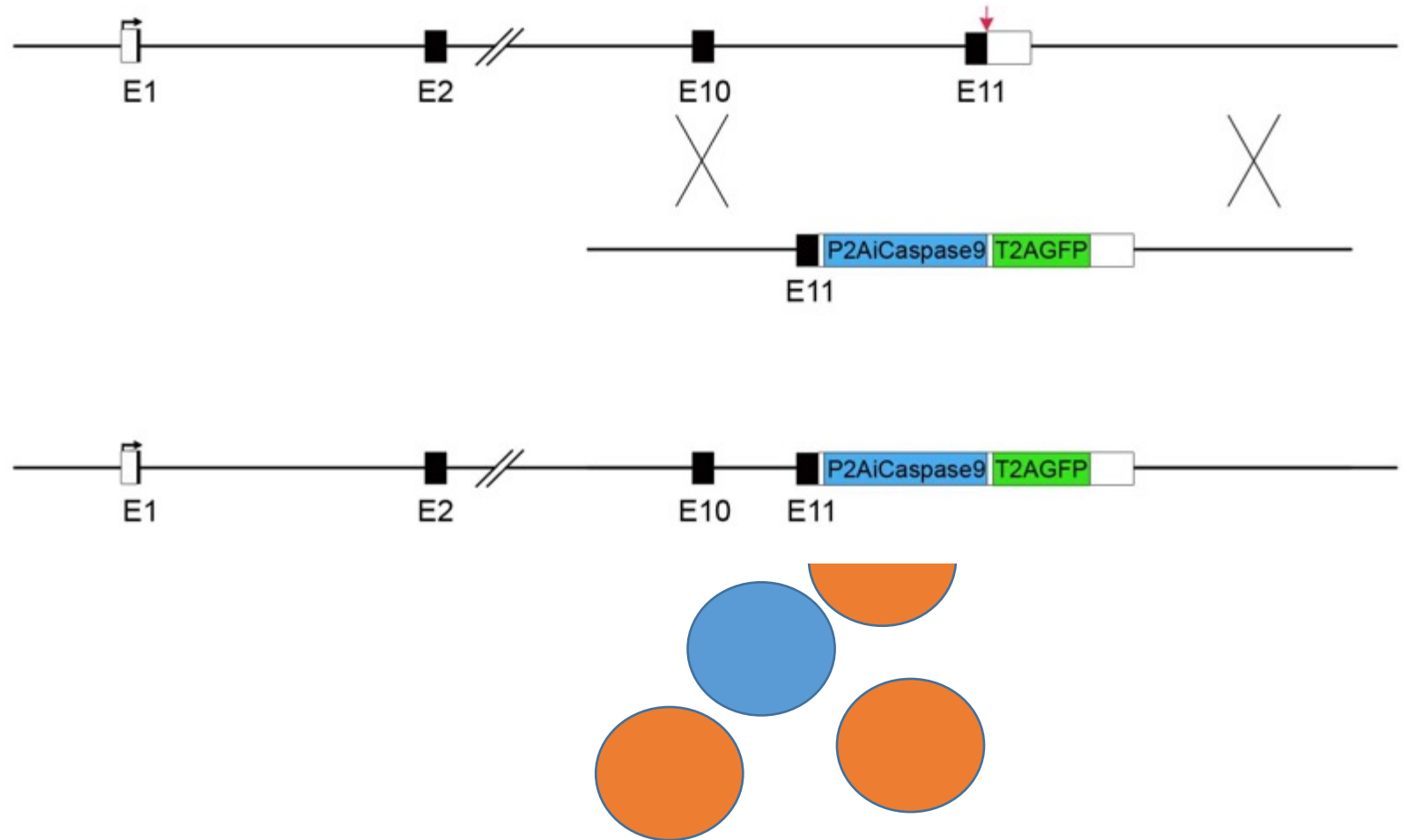
Transmission  
Rate: 1 in 300

# Surrogate sire surrogate dam breeding for generating pure offspring



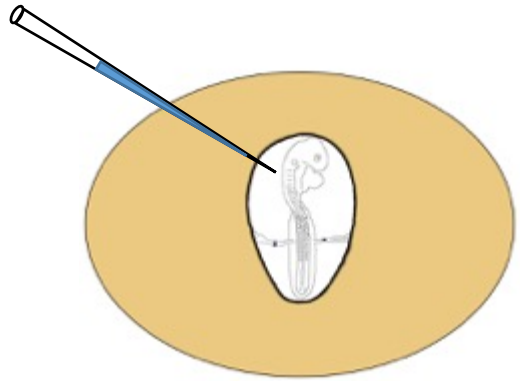
**100% donor offspring**

# DAZL locus

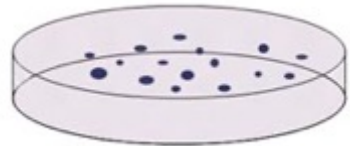




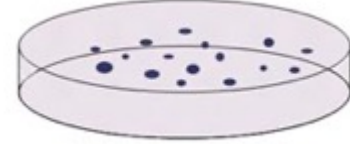
Isolate embryonic  
blood from pure  
breed eggs



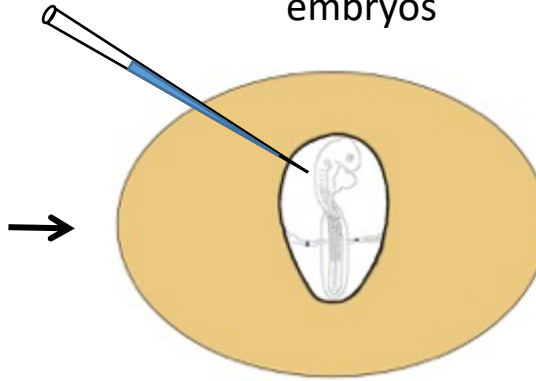
♂ PGCs



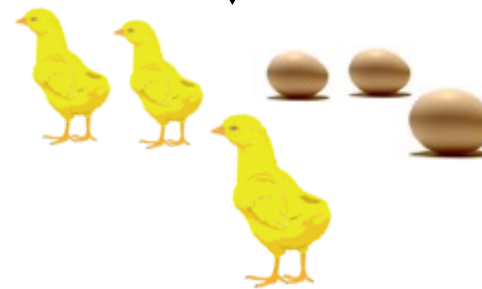
♀ PGCs



Microinject PGCs  
and B/B compound  
into iCaspase9 host  
embryos



Breed iCaspase9  
G<sub>0</sub> surrogate  
host chickens



Pure breed  
offspring



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# Biobanking at ILRI, Nairobi



7 ecotypes 128 PGC cell lines



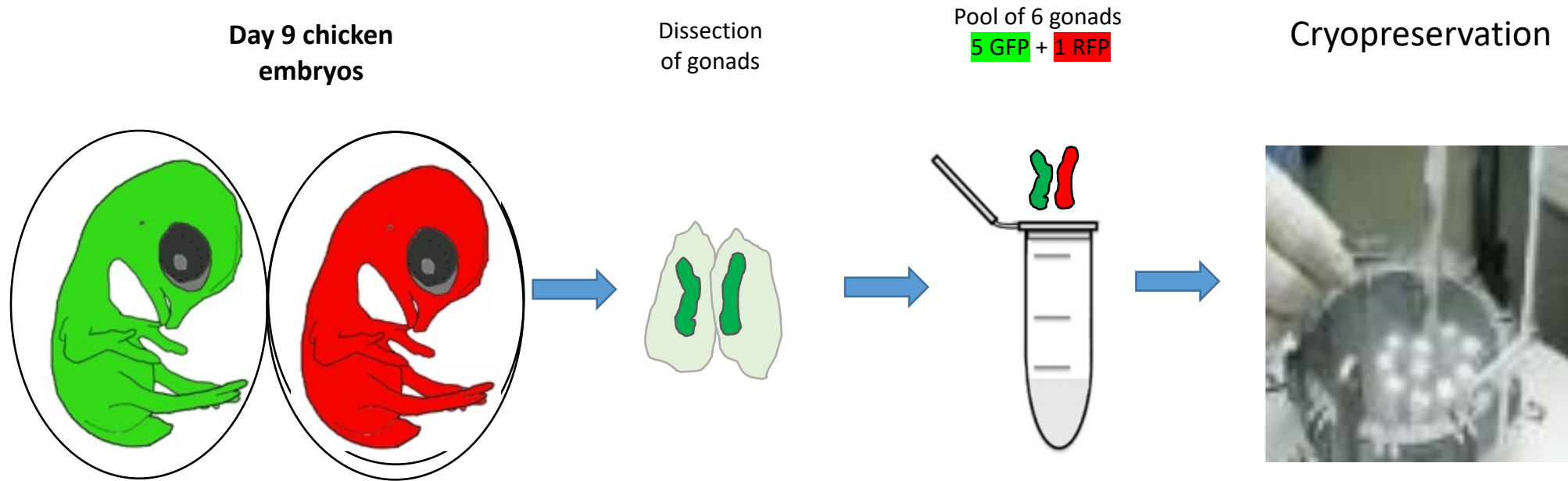
5 ecotypes 236 PGC cell lines



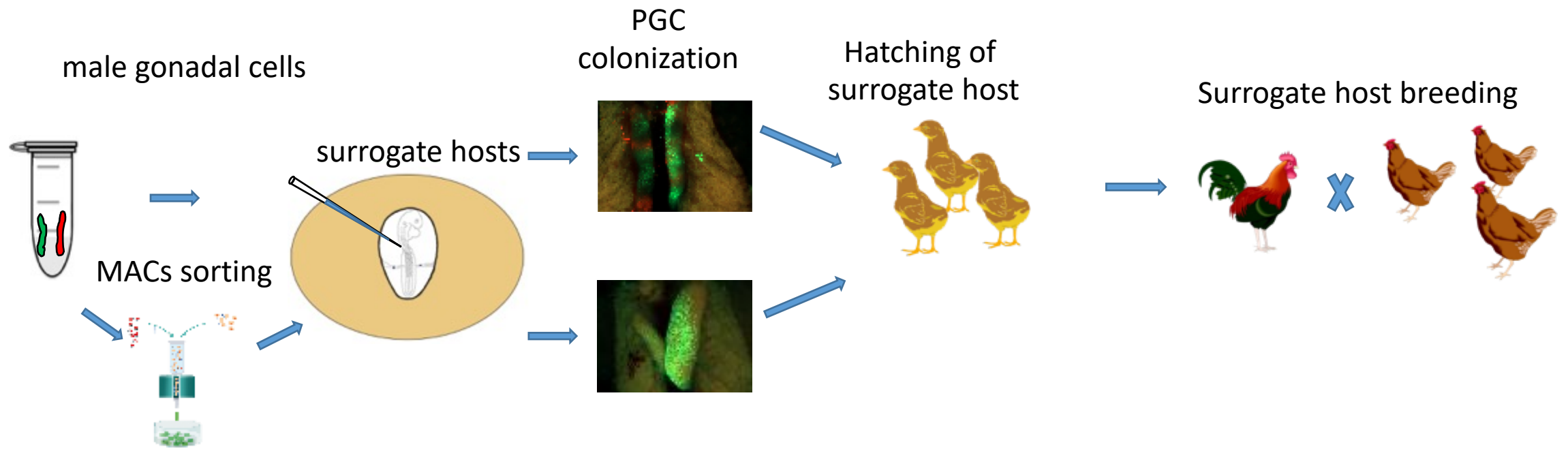
3 ecotypes 102 PGC cell lines

**3 Country ,15 'breeds' and 466 individual genotypes cryopreserved**

# Streamlining the process: eliminating the need to grow the 'diploid germ cells'







## Questions going forward

***How efficient is this process for preserving local breeds?***

Using 12 male embryos and 12 female embryos in one set of surrogate hosts will produce an outbred flock

- The future use ***of non- GE method*** for generating sterility of the surrogate host embryos will eliminate the need for a new regulatory guidance



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# Acknowledgements

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of Animals in Research