Ex situ conservation of indigenous poultry diversity: the way forward

Mike McGrew
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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
Cryopreservation (and revival) of bird species is difficult
Chick germ cells (PGCs)

Embryonic gonads

> 10,000 PGCs

circulating blood

(150 PGCs)

blastodisc

(50 PGCs)

area pellucida

germinai crescent

entrance into extra-embryonic blood vessels

transfer by extra- and intra-embryonic blood stream

Colonization of gonadal anlagen

Biobanking using primordial germ cells (PGCs)
Green Fluorescent Protein or a genome editor

Transmission Rate: 1 in 300

Offspring from cryopreserved female germ cells
Surrogate sire surrogate dam breeding for generating pure offspring

100% donor offspring
DAZL locus
Isolate embryonic blood from pure breed eggs

Male PGCs

Female PGCs

Microinject PGCs and B/B compound into iCaspase9 host embryos

Breed iCaspase9 G₀ surrogate host chickens

Pure breed offspring
Biobanking at ILRI, Nairobi

3 Country, 15 ‘breeds’ and 466 individual genotypes cryopreserved

Christian Tiambo, Steve Kemp, ACGG
Streamlining the process: eliminating the need to grow the ‘diploid germ cells’

Day 9 chicken embryos

Dissection of gonads

Pool of 6 gonads

5 GFP + 1 RFP

Cryopreservation

FCDO funding
surrogate hosts

male gonadal cells

MACs sorting

female gonadal cells

PGC colonization

Hatching of surrogate host

Surrogate host breeding

Yellow Non fluorescent

RFP GFP

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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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