

MERANCANG PEMBIBITAN AYAM PEDAGING DI INDUSTRI

ASEP ANANG
(Geneticist)
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Latar belakang

Broiler lokal mulai disuarakan
Apakah Indonesia siap?

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Geneticist:

1. Quantitative Geneticist
2. Molecular Geneticist

Beda keilmuan tapi saling membantu

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EDITORIAL

Shortage of quantitative geneticists in animal breeding

More and more I receive phone calls from various breeding companies looking to hire a PhD in quantitative genetics. They inquire if I know of a graduate versed in quantitative genetics and mixed models, with some programming skills, who can speak and write passable English, has a general understanding of markers and molecular genetics, can run and troubleshoot a genetic evaluation, and in general be a problem solver. I do not know of anyone available, I reply. There were many of them 10-15 years ago, but now they are rare. If they show up, they usually have very good offers well before graduation. My colleagues outside the USA are telling me of similar problems, although the severity of the PhD shortage is country dependent.

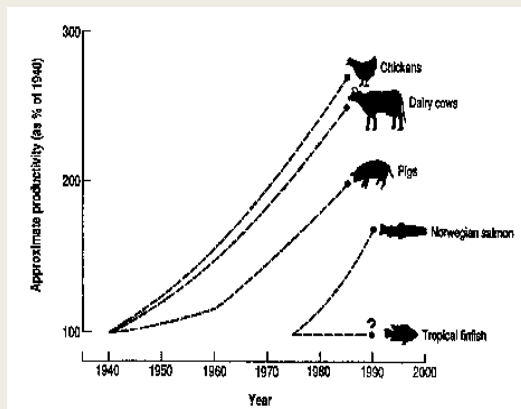
Great hopes were put into finding markers for major genes (QTL) that could help solve the new challenges. Based on many association studies, there is growing consensus that few markers/QTLs can be detected, those that were detected had their estimated effects inflated, and that the benefits of using markers are limited. Of all markers found, very few were for low-heritability traits.

The new trend in animal breeding is genomic selection using SNP chips. In this methodology, one estimates effects of individual haplotypes, and genomic EBV (GEBV) is estimated as a sum of those effects. No effort is made to identify QTLs. The genomic selection is based on an assumption opposite from the previous effort in markers but the same as in 'black box' genet-

Designer & Evaluator program pemuliaan diambang kepunahan

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Kemajuan genetik pada beberapa jenis Ternak



Kemajuan performa pada ayam paling cepat dibanding ternak lain

Mueir (2006)

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Project Pemuliaan Ayam Broiler

- Lama (pure line ke FS perlu 5 tahun + 3 tahun seleksi)
- Mahal (Fasilitas khusus untuk perbaikan mutu genetic)
- Perlu R&D Kuat (Disetiap strata)
- Input teknologi (Update)
- Efisiensi

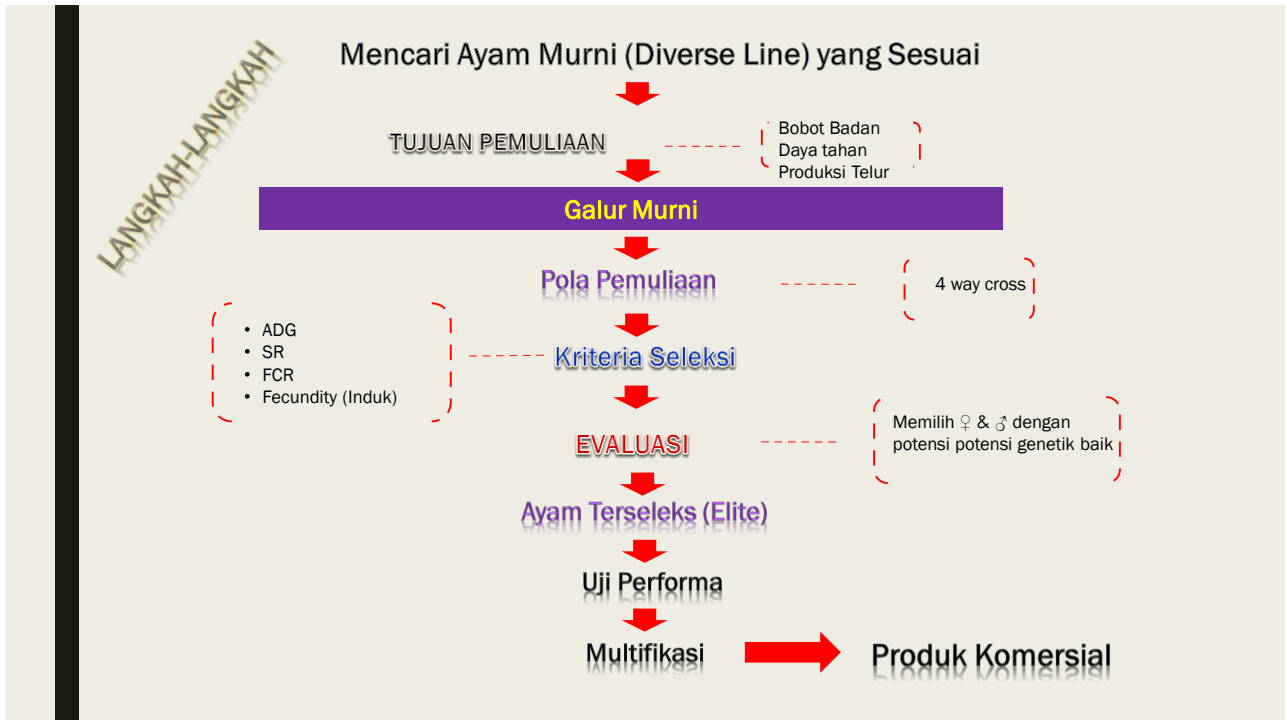
Perbibitan lebih ke strategis (kedaulatan), keuntungan lebih banyak di hilir

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Jika memulai Pembibitan

- Mandiri
(mengejar ketinggalan/Broiler tertinggal 100 generasi)
- Membeli sumber untuk bibit resmi
- Kerjasama dengan breeder (Short cut)
- Membuat pembibitan alternatif

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Diverse Line (Ayam Murni)

- Ayam murni yang belum mengalami proses pemuliaan
- Keragaman masih tinggi

Galur Murni

- Diarahkan pada sifat tertentu sesuai keinginan pemulia
- Misal : Pure line untuk sifat tumbuh, produksi telur
- Dalam mengarahkan pada suatu sifat, mungkin ada gena-gena yang hilang. Misal jika diarahkan pada sifat produksi, sifat daya tahan menurun
- Perusahaan biasanya mempunyai banyak galur murni

Pemuliaan ayam tidak membentuk bangsa/jenis

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Jenis Ayam yang Biasa Dipakai



White Plymouth Rock (Female Line)

Sumber: <http://www.mthealthy.com/blog/post/4038190>



New Hampshire (Female Line)

Sumber: <https://www.youtube.com/watch?v=0I3zueXIXB0>



White Cornish (Male Line)

<https://www.welphatchery.com/cornish-rock-broilers/cornish-rock-broiler-straight-run/>

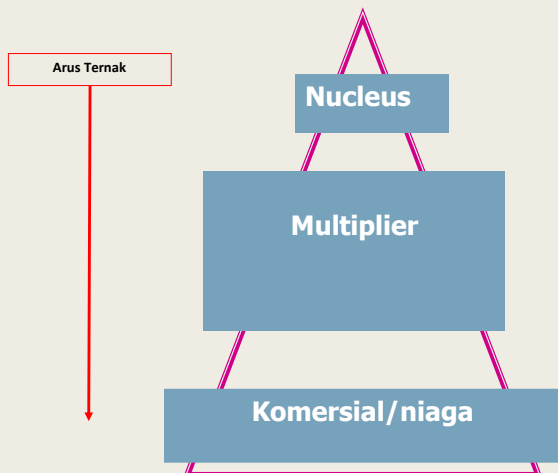


Light Sussex (Fe/Male Lines)

<https://www.welphatchery.com/cornish-rock-broilers/cornish-rock-broiler-straight-run/>

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Pola Pemuliaan



Nucleus (Pedigree):

- **Bebas penyakit (Mutlak)**

- Breeding Tertutup
- Pure Lines
- Terjadi seleksi genetic ketat
- Menghasilkan ternak unggul untuk Nucleus dan Multiplier

Multiplier :

- Terjadi persilangan antara ternak-ternak dari nucleus
- GGP, GP, PS
- Bisa untuk evaluasi di Nucleus

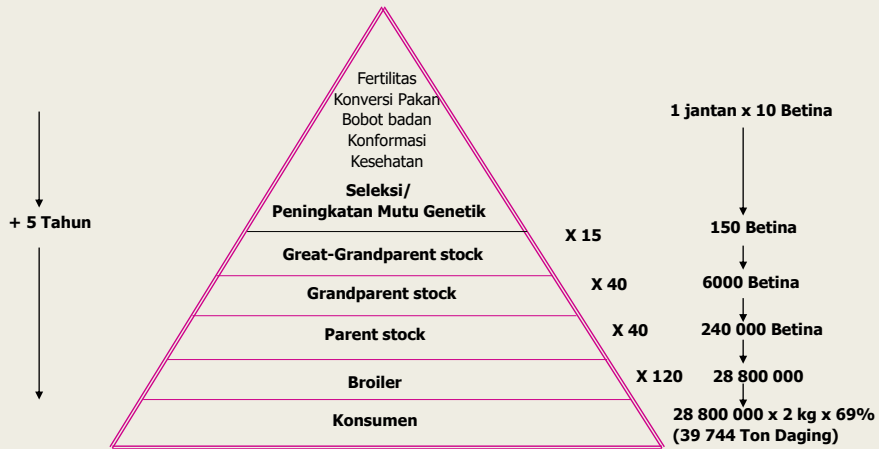
Komersial/Niaga

- Bentuk Final Stock/Strain
- Mempunyai heterozigotsitas yang tinggi, bila disilangkan sifat-sifatnya akan mengurai

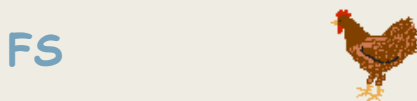
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Pola Pemuliaan pada Broiler



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Effective Population Size:
Minimum Populasi:
A & B: 20 pedigree pens
C : 30 pedigree pens
D : 75 pedigree pens
1 pens 1: Jantan 10-12 betina
Mass/Family selections

Proteksi:

- Generational lag (5 tahun)
- Hybridization (Pertumbuhan vs Produksi telur)
- Finalstock bukan Inbred (InCrossing)

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Kriteria Seleksi pada Ayam Pedaging (Tergantung Perusahaan & Galur)

Growth related	Reproduction
Growth rate	Egg number
Weight-for-age	Egg size
Feed efficiency	Hatchability of fertile eggs
Meat (breast) yield	Fertility
Carcass yield and body conformation	Libido
Livability	Mature weight and age
Skeletal integrity	Liveability
Feathering - cover, rate and color	Aggressiveness (±)
Adaptation to heat distress	Adaptation to heat distress

Traits emphasized in males:

- Meat yield
- Weight for age
- Days to market
- Feed efficiency
- Body conformation
- Fat content
- In recent years males have also been selected for reproductive performance

Traits emphasized in females:

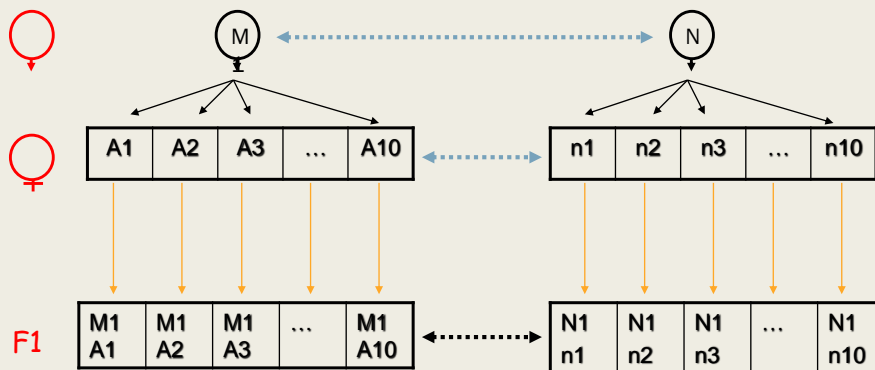
- Fertility
- Hatchability
- Age at sexual onset
- Rate of egg production
- Growth performance is still monitored

Peralatan ≈ kedokteran manusia

- Pengukur kualitas karkas (Ultrasound)
- Pengukur intake Oksigen
- Konformasi tubuh

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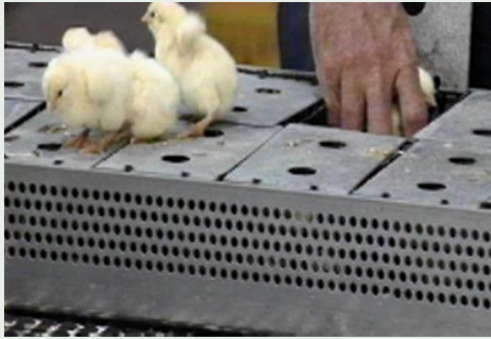
Pola Perkawinan



Mass Selection atau Family Selection

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Pedigree Hatch

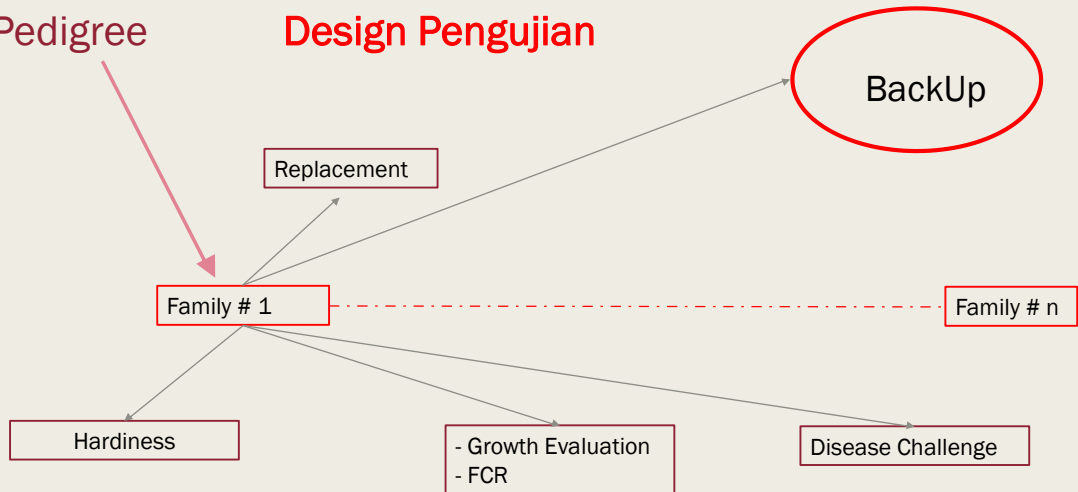


Sumber foto : Cobbs

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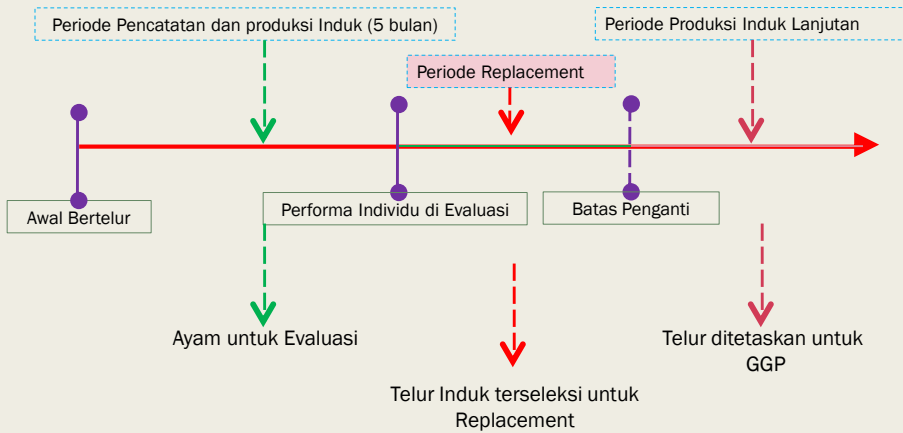
Pedigree

Design Pengujian



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Periode Evaluasi



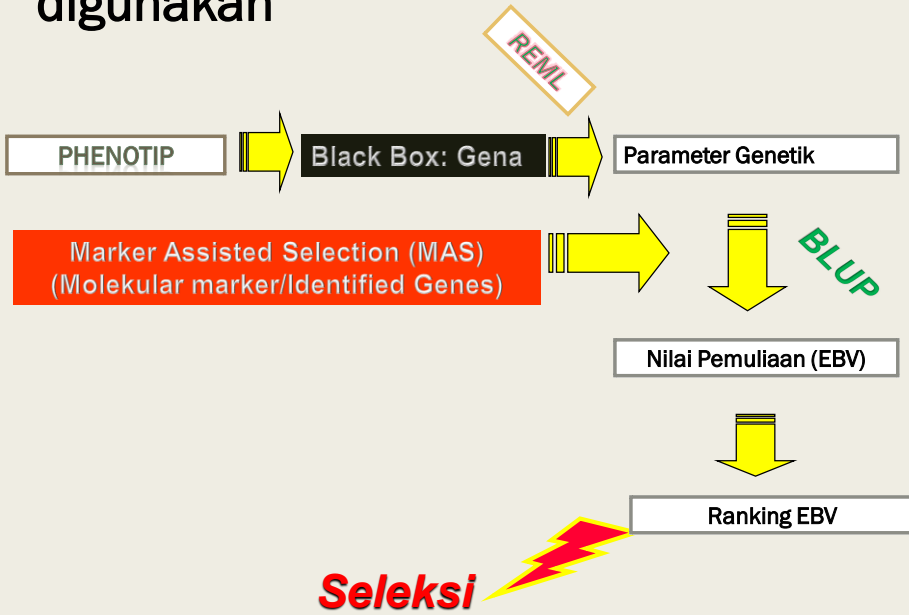
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Sejarah Analisis Evaluasi Genetik

Technique	Decade of introduction (approximate)
Mass selection	1900
Trapnesting	1930
Hybridization	1940
Pedigreeing	1940
Artificial insemination	1960
Osborne index	1960
Family feed conversion testing	1970
Selection index	1980
Individual feed conversion testing	1980
BLUP breeding value estimation	1990
BLUP + DNA markers	2000

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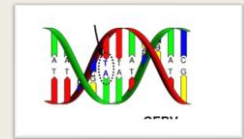
Evaluasi Genetik yang banyak digunakan



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$$\begin{bmatrix} X_1'X_1r^{11} & X_1'X_2r^{12} & X_1'Z_1r^{11} & X_1'Z_2r^{12} \\ X_2'X_1r^{21} & X_2'X_2r^{22} & X_2'Z_1r^{21} & X_2'Z_2r^{22} \\ Z_1'X_1r^{11} & Z_1'X_2r^{12} & Z_1'Z_1r^{11} + A^{-1}g^{11} & Z_1'Z_2r^{12} + A^{-1}g^{12} \\ Z_2'X_1r^{21} & Z_2'X_2r^{22} & Z_2'Z_1r^{21} + A^{-1}g^{21} & Z_2'Z_2r^{22} + A^{-1}g^{22} \end{bmatrix} \begin{bmatrix} \hat{b}_1 \\ \hat{b}_2 \\ \hat{u}_1 \\ \hat{u}_2 \end{bmatrix} = \begin{bmatrix} r^{11}X_1'y_1 + r^{12}X_1'y_2 \\ r^{21}X_2'y_1 + r^{22}X_2'y_2 \\ r^{11}Z_1'y_1 + r^{12}Z_1'y_2 \\ r^{21}Z_2'y_1 + r^{22}Z_2'y_2 \end{bmatrix}$$

Multivariate BLUP



MAS

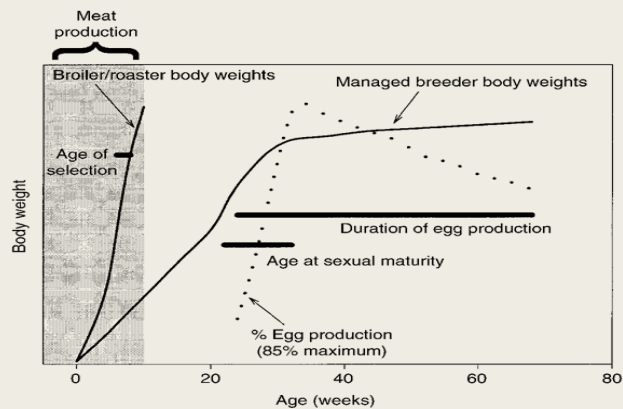
Genetic Evaluation

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Tidak dikembangkan transgenic

Transgenic technologies are not expected to have a significant effect on commercial meat-chicken breeding in the foreseeable future. Transgenic technologies have not advanced in birds as much as in mammals and it is becoming more and more clear that consumers worldwide are opposing such a development.

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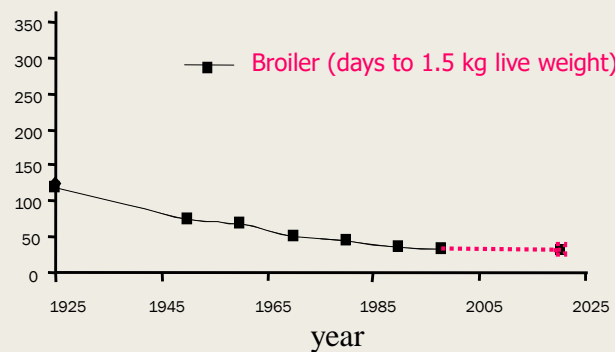
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Uji Performa

- Keberhasilan suatu program pembibitan (Geneticist) ditentukan oleh bagaimana performa ternak yang dihasilkan dilapangan.
- Untuk setiap strata (GPS, PS, FS)
- Dengan melakukan uji lapangan, pembibit tahu apakah sifat-sifat yang diperbaiki sesuai dengan yang diinginkan.
- Ternak diuji di lingkungan standard, seperti pakan dan manajemen yang layak.
- *Competitor Test* atau pengujian dengan membandingkan produk kita dengan produk dari perbibitan lain yang sejenis

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Perkembangan Performa Ayam Broiler



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Tahun	Hari	Bobot (kg)	FCR	Mortality (%)
1925	112	1.13	4.70	18
1935	98	1.30	4.40	14
1940	85	1.31	4.00	12
1945	84	1.37	4.00	10
1950	70	1.40	3.00	8
1955	70	1.39	3.00	7
1960	63	1.52	2.50	6
1965	63	1.58	2.40	6
1970	56	1.64	2.25	5
1975	56	1.71	2.10	5
1980	53	1.78	2.05	5
1985	49	1.90	2.00	5
1990	48	1.98	2.00	5
1995	47	2.12	1.95	5
2000	47	2.28	1.95	5
2005	48	2.44	1.95	4
2006	48	2.48	1.96	5
2007	48	2.50	1.95	5
2008	48	2.53	1.93	4
2009	47	2.54	1.92	4
2010	47	2.59	1.92	4
2011	47	2.63	1.92	4
2012	47	2.65	1.90	4
2013	47	2.69	1.88	4
2014	47	2.73	1.89	4
2015	48	2.78	1.89	5
2016	47	2.79	1.86	5
2017	47	2.81	1.83	5
2018	47	2.84	1.82	5

Perkembangan Performa Ayam Broiler

Banyak titik lemah:

- Flexibilitas temperatur
- Mudah stress
- Daya tahan
- Reproduksi di induk

- Penyesuaian Lingkungan (Close house)
- Management dan Nutrisi yang tepat

Apakah alih generasi masih sesuai dengan kemampuan peternak?

Sumber : National Chicken Council, 2019.

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Kemungkinan Pembibitan di Indonesia

- Tidak ada yang tidak mungkin, perlu keinginan kuat dan konsistensi
- Support investasi
- Sumber ayam yang '*legal*'
- Praktisi
- R&D
- Designer/geneticist (Praktisi)
- Kerjasama breeders (Transfer teknologi)

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TERIMA KASIH