

Other Concepts in Genetics

And

Exception Of Mendelism

Non-traditional inheritance involves alleles that are not dominant or recessive.

- Incomplete/partial dominance,
- co-dominance

1. Partial, or incomplete dominance :

the heterozygous organism exhibits a trait in-between the dominant trait and the recessive trait.

.A. Homozygous mice are **black (BB)** or **white (bb)**

heterozygous mice will be **grey (Bb)**.

B. Sheep exhibit in the trait for eye color.

When a pure, brown-eyed sheep is crossed with a pure, green-eyed sheep, blue-eyed offspring are produced.

2. Codominance :

heterozygote exhibits traits found in both associated homozygous individuals.

EX. A. **the feather color of chickens.**

If a homozygous black rooster is mated to a homozygous white hen, the heterozygous offspring would have both black feathers and white feathers.



B. Roan is a coat color in horses

(sometimes dogs and cattle) that is a mixture of base coat colored hairs (ex. black, chestnut) and white hairs.

Neither the base coat color or the white hairs are dominant nor do they blend to create an intermediate color.

Catatan: Warna Roan terdiri dari dua warna (merah dan coklat) dengan rambut putih..

NORMAL VS. EXCEPTION OF MENDELISME

Simple, Normal:

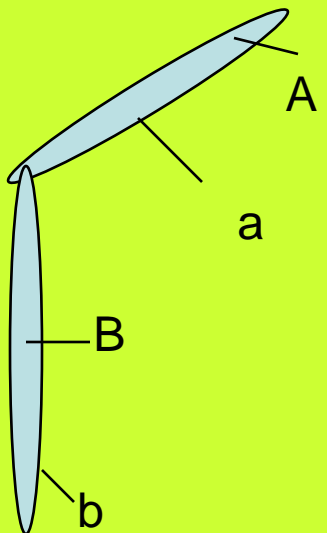
P: TT x tt
Gamet T Gamet t
F1 : Tt X Tt
Gamet T T
t t
F2 : TT : 1
Tt : 2 3
tt : 1 1

Normal Ratio:

Abnormal Ratio : be 2:1 (lethal)

P. AB x ab
AaBb X Aa Bb
Gamet: AB : type parental
ab : type parental
Ab : rekombinan
aB : rekombinan

(AABB,aabb)



Mendel Exception:

1. gen lethal

2. Inheritance related to sex

(gen in Chrom. Sex)

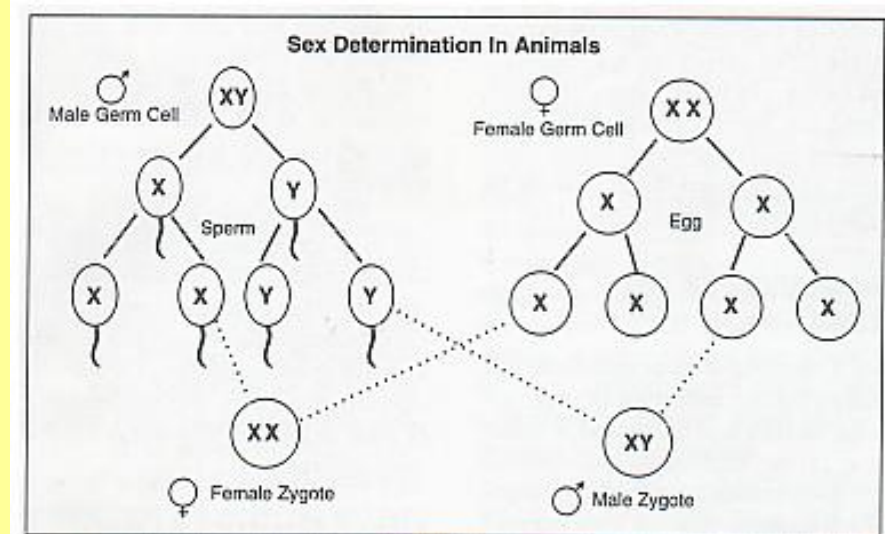
sex linkage : Chrom X/Y

sex limited ; Gen in Female/Male

sex influenced Gen in Female/Male (Diff Expression)

3. Epistasi:

Gen interaction, non allelic, one Gen conceal to others gen.



1. Gen lethal:

In Homosigotik Dominan/Recesif To be lethal

genotip > Environment

Exp.; homosigot dominan

Chickens: : Gen dominan C (lethal)
gen c = normal;

Cc = , Creeper)

CC : lethal

Cc ? : from cc mutation to be .

(gen c menjadi C)

P: Cc X Cc

F1

F1: CC : mati

Cc : creeper

Cc: creeper

cc ; Normal

Rasio Fenotipe; 2 : 1

Rasio genotipe: 1 : 2 : 1

Expl.: **gen Homosigot resesif**

Pada cattle, **gen resesif (am) lethal** (sapi lahir tak punya kaki)

AmAm : normal

Amam : normal

amam: lethal

Am am X Am am

F1

AmAm : NORMAL

Amam : ?

amAm : ?

amam : lethal

Conclusion:

1. Dominan heterosigotik; Cacat (creeper), ayam

Resesif, heterosigotik *normal (scows

2. PENYIMPANGAN HK. MENDEL

KRN ADANYA **GEN LETHAL**

2. INHERITANCE TO SEX

1. SEX LINKAGE

In X- Chromosome

Chromosome $Y < X$

2. SEX INFLUENCED

in **autosome**, tetapi ekspresinya dipengaruhi oleh sex pada heterosigot, dominan pada jantan

3. SEX LIMITED

Expl. Dairy cows .(milk –Production)

1. Sex-Linked Traits

Sex-linked traits involve genes that are carried only on the X or Y chromosomes, which are involved in determining the sex of animals.

The female genotype is XX, while the male genotype is XY.

The X chromosome is larger and longer than the Y chromosome, which means a portion of the X chromosome does not pair with genes on the Y chromosome.

Additionally, a certain portion of the Y chromosome does not link with the X chromosome.

The traits on this portion of the Y chromosome are transmitted only from fathers to sons.

Sex-linked traits are often recessive and are covered up in the female mammal by dominant genes.

1. Sex Linked

A. *Drosophila melanogaster* (**Red eyes**) (dominan) twhite eyes
(recessif)

Teoritis : MM x mm
Red white
Mm ()
Red

Linkage Gen pd Krom X:

JTN putih X BTN Red

F1 Red

XY

XX

m-

MM

Mm : BTN white

M- : JTN Red

JTN Red X BTN white

F1: Red 50 %

white 50 %

M- X mm

Mm : BTN Red

m- : JTN white

Conclusion:

- Gen resesif memperlihatkan pengaruh pada jantan saja
- Gen warna terletak pada kromosom X

B. In poultry,:

the male has the genotype XX, while the female has the genotype Xw.

An example of a sex-linked trait in poultry is the barring of Barred Plymouth Rock chickens.

If barred hens are mated to non-barred males, all of the barred chicks from this cross are males, and the non-barred chicks are females.

Br - Br Br
Xw x XX
Betina Jantan



BrBr : Bared, jantan

Br-: non Barred Betina



2. Seks Influenced:

Sheep :horned.

Dorset ; JTN, BTN bertanduk (TT) (horned)

Suffolk : JTn BTB tak bertanduk (tt) (polled)

TT x tt

F1 Tt : JTN bertanduk (dominan)

Tt : BTN tak bertanduk (resesif)

Tt x Tt

TT

JTN : 3 bertanduk, 1 tak bertanduk

Tt

BTN : 1 bertanduk, 3 tak bertanduk

Tt

tt

Genotip	JTN	BTN
TT	+	+
Tt	+	-
Tt	-	-

3. Sex Limited:

Gen ada pada jantan dan betina, ekspresinya berbeda

-Manusia : seks sekunder : kumis pada JTN, pada BTN tidak muncul

-Pada ternak perah: Progeny test.

produksi susu : muncul pada betina saja

Kupu semanggi: putih dominan hanya pada BTN

	JTN	BTN
PP	kuning	putih
Pp	kuning	putih
pp	kuning	kuning

3. Epistasis (Polygenic Inheritance)

It is possible for more than one gene to control a single trait.

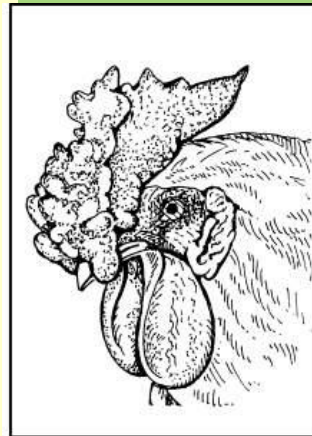
This type of interaction between two nonallelic genes is referred to as epistasis.

When two or more genes influence a trait, an allele of one of them may have an epistatic, or overriding, effect on the phenotype.

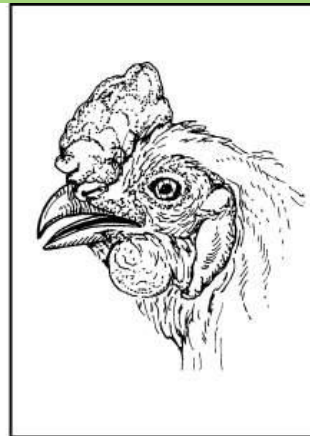
Comb shape in chickens is an example of an epistatic relationship.

Domestic chickens can have four different types of comb shapes:

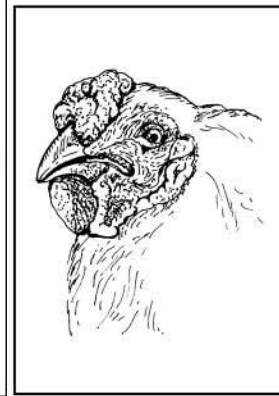
- (a) rose,
- (b) pea,
- (c) walnut,
- (d) single.



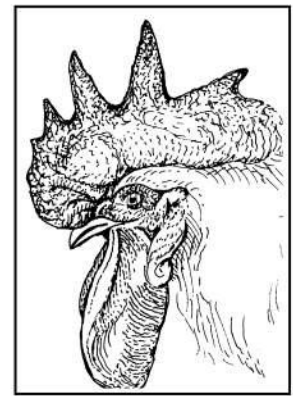
(a)



(b)



(c)



(d)

Comb shape is influenced by two independently assorting genes, R and P, each with two alleles.

Wyandotte chickens with rose combs (**RRpp,**)

Brahma chickens with pea combs (**rrPP.)**

The F_1 , hybrids between these two varieties are RrPp; phenotypically, they have walnut combs.

The F_2 , If those hybrids are intercrossed with each other, all four types of combs appear in the progeny in a ratio of 9:3:3:1 for walnut:rose:pea:single.

♂ Male gametes

	RP	Rp	rP	rp
♀ Female gametes RP	RR PP walnut	RR Pp walnut	Rr PP walnut	Rr Pp walnut
Rp	RR Pp walnut	RR pp rose	Rr Pp walnut	Rr pp rose
rP	Rr PP walnut	Rr Pp walnut	rr PP pea	rr Pp pea
rp	Rr Pp walnut	Rr pp rose	rr Pp pea	rr pp single

Summary: 9/16 walnut, 3/16 rose, 3/16 pea, 1/16 single