

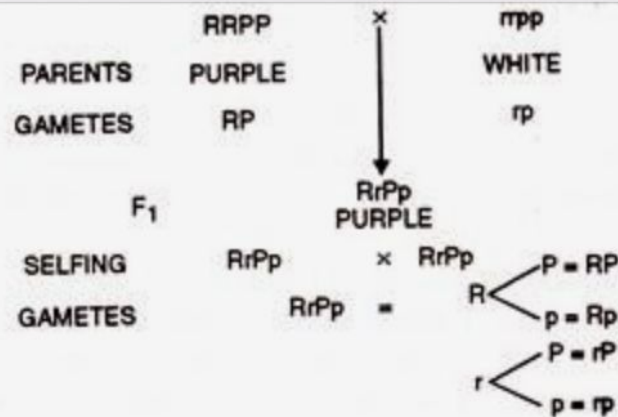
Supplementary genes

Supplementary Genes (9:3:4)

Supplementary genes are two independent dominant genes interacting to produce a phenotypic expression different from that produced by either gene alone. Or in supplementary gene action, the dominant allele of one gene is essential for the development of the concerned phenotype, while the other gene modifies the expression of the first gene.

Example 1: the development of grain colour in maize is governed by 2 dominant genes 'R' and 'P'.

The dominant allele 'R' is essential for red colour production; homozygous state of the recessive allele 'r' (rr) checks the production of red colour. The gene 'P' is unable to produce any colour on its own but it modifies the colour produced by the gene 'R' from red to purple. The recessive allele 'p' has no effect on grain colour.



		Gametes				
		♂	RP	Rp	rP	rp
F ₂	♀	RP	RRPP Purple	RRPp Purple	RrPP Purple	RrPp Purple
	Gametes	Rp	RRPp Purple	RRpp Red	RrPp Purple	Rrpp red
	rP	RrPP Purple	RrPp Purple	rrPP White	rrPp White	
	rp	RrPp Purple	Rrpp Red	rrPp White	rrpp White	

Results : 9 Purple : 3 Red : 4 White

(Cross between Purple and White grain colour in Maize.)

<http://eagri.org/eagri50/GBPR111/lec03.pdf>

Eg.2 Inheritance of combs in fowls (9:3:3:1)

In fowls there are four varieties of combs. Rose, pea, walnut, and single.

Rose comb is controlled by a dominant gene R and pea is controlled by another dominant gene P.

The recessive alleles of the above genes in the homozygous condition (rrpp) produce single comb. But when the two dominant genes R and P are brought together they interact and produce new comb called walnut.

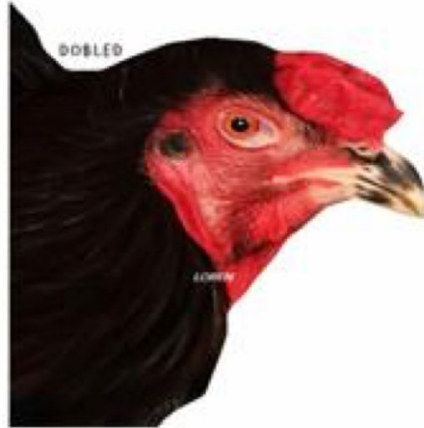
Single



Rose



Pea



Walnut



Figure 1. Four comb types

Walnut comb is due to interaction of two nonallelic dominant genes R and P. And the single comb is due to the interaction of two recessive genes r and p.

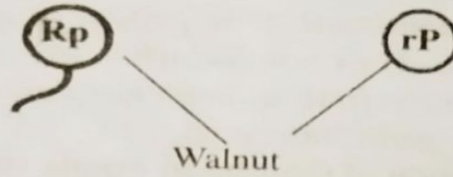
When a pure rose combed (RRpp) chicken is crossed with that pure pea combed (rrPP) chicken. The F1 progeny contains walnut.

Then the F1 walnut is self crossed. In the F2 all the four types of combs appear in the ratio 9:3:3:1 (walnut, rose, pea single)

Parents : Rose comb male x Pea comb female

RRpp **rrPP**

Gametes :

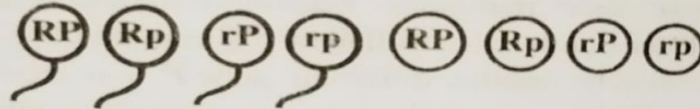


F₁ Generation:

F₁ Fowls Walnut male x Walnut female

are crossed : **RrPp** **RrPp**

Gametes:



Gametes	RP	Rp	rP	rp
RP	RRPP Walnut	RRPp Walnut	RrPP Walnut	RrPp Walnut
Rp	RRPp Walnut	RRpp Rose	RrPp Walnut	Rrpp Rose
rP	RrPP Walnut	RrPp Walnut	rrPP Pea	rrPp Pea
rp	RrPp Walnut	Rrpp Rose	rrPp Pea	rrpp Single

F₂ generation: Walnut : 9, Rose : 3, Pea : 3, Single : 1

Fig.3.3: Inheritance of combs.

Eg.3 Coat color in mice (9:3:4)

There are three varieties of mice. They are agouti (grey) black and albino (White).

Agouti color is dominant to both black and albino. Black is dominant to albino but recessive to agouti. Albino is recessive to both agouti and black.

