

will contain the red factor in 50 per cent. of its germ-cells and the black factor in the remaining 50 per cent. For example, cross a black animal with a red and we get this result :—

				Black Animal.	Red Animal.
Germ-cells	..	..	..	Black	Red.

The result of this cross is a black animal, because black is dominant to red; but half the germ-cells of the progeny are red. Cross two animals bred this way and we get the following results :—

				Bull.	Cow.
50 per cent. germ-cells..	..	..	..	Black	Black.
50 per cent. germ-cells..	..	..	..	Red	Red.

The progeny may be the result of the meeting of a black germ from the bull with a black germ from the cow, and the result will be a pure-black carrying only the factor for black in its germ-cells. The progeny may be the result of a black germ from the bull meeting with a red germ from the cow, and the progeny, while black in colour, will have the factor for red in half its germ-cells. A similar result will come from the meeting of a red germ from the bull with a black germ from the cow. A fourth alternative is the meeting of a red germ from the bull with a red germ from the cow; the progeny will then not only be red in colour, but all its germ-cells will carry the factor for red, and it will breed true as a pure-red. One-fourth of the calves from this cross are therefore pure-blacks, one-half are blacks carrying the factor for red in half their germ-cells and the factor for black in the other half, and one-fourth are pure-reds. To illustrate the result :—

		Offspring			
		No. 1.	No. 2.	No. 3.	No. 4.
50 per cent. germ-cells ..	Black	Black	Black	Black	Red.
50 per cent. germ-cells ..	Black	Black	Red	Red	Red.

No. 1 bred with another pure-black will breed true blacks. No. 2 and No. 3 bred together will give the same results over again as those first explained; and No. 4 is a pure-red, and if bred with other pure-reds will breed true.

Now let us examine the result of crossing offspring Nos. 1 and 2. We get the following :—

			No. 1.	No. 2.
50 per cent. germ-cells ..	..	..	Black	Black.
50 per cent. germ-cells ..	..	..	Black	Red.

If either of the black germs from No. 1 unite with the black germ in No. 2 we get pure-blacks, but if either of the black germs in No. 1 unite with the red germ in No. 2 we get a black animal carrying the factor for red in half its germ-cells. Out of every four calves from this cross we get :—

		No. 1.	No. 2.	No. 3.	No. 4.
50 per cent. germ-cells ..	Black	Black	Black	Black	Black.
50 per cent. germ-cells ..	Black	Black	Black	Red	Red.

If we now cross No. 1 and No. 2 we get pure-blacks, but if we cross No. 2 and No. 3 we get the results again just explained. If we cross Nos. 3 and 4, as already explained, we get one pure-black to two blacks carrying the factor for red in half their germ-cells, and one, the fourth, will be a pure-red.

From the foregoing it will be seen (a) that before a red calf can appear in a black herd both sire and dam must both carry the factor