layers must therefore get this factor from their fathers. This is why such high prices are paid for cockerels from hens with a high egg-record.

When a "silver" cock is mated to a "gold" hen these colours follow the regular Mendelian rules, silver being dominant. All the progeny are "silver," but carry the "gold" inheritance-factor in half their germ-cells. When, however, a "silver" hen is mated with a "gold" cock the progeny are "silver" cocks and "gold" hens. This shows still another peculiar difference in male and female inheritance.

Evidence, too, goes to show that milk and butterfat production in dairy cows is inherited more through the male than the female—that is, a high-producing cow transmits her producing-qualities more through her sons than through her daughters. It is becoming more and more recognized by dairymen that to improve their herds or maintain them at a high standard they must use bulls from high-producing dams.

INBREEDING, LINE-BREEDING, AND OUTCROSSING.

The questions of inbreeding, line-breeding, and outcrossing have probably been more discussed and written about than any other aspect in connection with the breeding of purebred stock. It seems to be generally agreed that close inbreeding (*a*) fixes type, (*b*) increases prepotency, (*c*) brings out and intensifies good qualities, (*d*) brings out and intensifies bad qualities, (*e*) if long continued, reduces vitality and size and weakens constitution. Outcrossing increases size, vitality, and constitution, but decreases prepotency, and tends to produce unevenness in type. There is always the risk, too, when bringing in an outcross, of introducing a bad quality or weakness that is very difficult to afterwards get rid of. The illustration given of results in crossing black and red cattle shows how difficult it is to get rid of a hidden red taint. The same principles apply to other qualities.

Line-breeding is the mating of animals not so closely related as the relationships that are looked upon as inbreeding. The principle involved is the same; the difference is one of degree. The idea behind line-breeding is to get the advantages of inbreeding, and at the same time to avoid its disadvantages, and also avoid the risks attached to the introduction of an outcross.

Experience and experiments go to show that the loss of vitality, size, and constitution that generally follows continued in-and-in breeding is quickly put right by the introduction of an outcross, and that no animals respond so quickly to the advantages of an outcross as animals that have for some time been closely inbred. The outcross seems in one generation to bring back the size, constitution, and vitality that was lost by continued inbreeding.

The aim of the stud breeder is to produce the most perfect animals possible, and at the same time animals that will breed true. To breed true the animals must have uniform germ-cells all carrying the same inheritance-factors. This uniformity of germ-cells is gained by close inbreeding. With an outcross there is always the danger of introducing germ-cells carrying the factor for some fault that it may prove afterwards very difficult to eliminate. The problem to be solved is to overcome the loss of size, vigour, and constitution brought about by continued inbreeding, and at the same time avoid or reduce to a