October 21, 1915

profitable or sure under average conditions as to depend upon production.

When production alone is considered, the highgrade animals may give equally as good returns as the pure-bred. For the reasons that a st.rt may be made at a lower figure and the heavy prodecion may be obtained from high grades, and considering the fact that less experience fa required in handling, it is usually more advisable to start with good grades and continually grade higher, then add an occasional pure-bred to the herd, than to try to start with all registered animals.

Cross Breeding

Many mistakes are often made in crossing breds. This practice in itself defeats the very object for which breeds have been developed. Ceruin characteristics and tendencies have been interministible, and it is often thought that by crossing two breeds the desirable characters of each may be obtained. For example, the quantic-producing Holstein is often crossed with the quality-producing Jersey in an effort to secure agre quantity combined with quality. The frequent result is the low quantity of the Jersey combined with the low quality of the Jersey

The outcome of crossing can never. be depended upon and the second generation will be more unsatisfactory than. the first. The dairy farmer who selects good animals from the breed which best suits his tastes and locality, and not only selects good individuals, but selects those which will transmit their strong characters, then stays with that breed and continues to grow better individuals by incessantly weeding out the poorer ones, will meet success in due measure of financial returns and in that

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Why Tile Drains are Profitable

The Principles on Which They Work Simply Explained

" T'S the best 10 acres on the farm." We knew that our friend spoke the truth for we knew that farm well; well enough, too, to remember when that particular field had been the poorest section of the farm with sedge grass as its only crop. One line of six-inch tile through the lowest lying land with three or four laterals of four-inch tile had made the difference. An expenditure of \$50 f ... tile and labor had made the difference between a few tons of inferior hay and 600 bushels of oats. Why did tile drains make such a great difference? The question is of particular interest in the fall of the year when the drainage season is with us again. One of the clearest expositions of the action of tile drains, which makes them so efficient and profitable, that we have ever seen, appeared recently in a report from the Iowa Experimental Station. It is as follows:

"As soils are made up of very small particles of irregular shape, it is impossible for them to lie



Her Merit Is Proved by Her Production.

Lass ddth, seen herwerith, is now the champion junior four-year-old of the Jersey world. Her production is 1344.6 Ha. or milk and 2017. Ho. of builter fat. Her typp is well worthy of study by Jersey breeders who value production as the most desirable attribute of a dairy oow. Owned by Hood Farm, Lowell, Mass.

joy of achievement gained from work well done.

With The Cows Nowadays

CLOSE cooperation is necessary to secure profits from the dairy herd,-cooperation between the man and his cows. A drive through our own community recently, forced me to the decision that so far as many owners are concerned, this chooperation is lacking. The cows have been on poor pastures all summer. They are thin in consequence. They are still on poor pastures and this is bad both from the standpoint of the pasture and the cow.

First let us consider the pasture. The grass which grows in the cold weather of the fall is of low nutritive value. This growth is not intended to afford cow feed, but rather a protection to the grass roots through the coming winter. When this product must be cropped short by half starving cows, there is a long chance that much of the best grass in the pasture will be killed out before spring, weeds and inferior. grasses will take its place and the result will be a pasture continually declining in value.

The effect on the cows is equally dishstrous. The cows cannot keep up their milk flow and are dry before the snow flies. I believe that even when summer dairying is practiced, it is the extra (Concluded on page 6) close enough together to form a solid mass; there remain spaces between these particles large enough to permit the entrance of wate. After a tile line is established, this water gradually works its way down to the tile and enters through the opening at the joints. If the tile is laid properly, no dirt will be carried into the tile line which will no pass out with the water.

Wet Soil Prevents Growth

"When soil is saturated, that is, when water fills all the space between the particles, it contains no air and is unfit for the promotion of healthy plant growth. This water of saturation, acting under the force of gravity, will flow through the soil as soon as a portion of it is removed at the point of outlet into a tile drain. In this motion, or freeing of the space between the soil particles, a vacuum is created and the weight of the atmosphere on the surface of the soil forces air to follow the water as it flows out of the ground into the tile.

"In this action, three laws of nature have been followed: first, the law of gravity, which causes the water to flow toward the tile; second, the law of surface tension, which holds the amount of required moissure around the soil particles; and the law of atmospheric pressure which forces air into unoccupied space.

"Now this air, which enters the soil following the water as it leaves the spaces between the soil particle, prevents the packing of the soil particles and thus retards the action of capillary attraction, which tends to bring the soil moisture to the surface where it evaporates in warm, windy weather. It also leaves an open way for the plant roots to reach down to the soil moisture and plant food it contains.

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"The breaking-up of the surface pack or crust introduces air into the surface soil, holding the small particles from close contact, thus preventing capillary attraction, or the drawing of the moisture from the subsoil to the surface, where it evaporates rapidly on a warm, windy day. The stopping of evaporation means that the water which is held by the small particles of soil, and which contains the plant food, remains it place and the spaces between these film-covered particles of soil, having been drained of surplus or harmful water by the action of a tile ditch, furnish a way for the plant root to penetrate to the lower or subsoil and reach the stored food contained in the moisture held around the soil particles by the force known as surface tension.

Moisture Storage Capacity

"Tile-drained lands are always perfectly propared for the process of plant-food assimilation. Such lands have the greatest storage capacity for useful moisture, take up the full value if Eght rains during dry seasons and, because if their open condition, do not permit of rapid erapy-ation; and provide ample air content for the growing plants. Tile lands are therefore much more able to successfully carry growing plants thr sup a season of drought than are untiled lands.

"Farmers do not always realize that growing plants require large quantities of air. It is always pleniful above ground, but it is needed in the soil quite as much as water. Draining of land is done quite as much for the purpose of putting air in the soil as for removing the harmful water. Any soil would derive a benefit from drainage simply for the purpose of introducing air. Soils breathe, and those which do not breathe proposerly aever produce full crops.

"The drains supply air to the subsoil at all times. The atmosphere contains a large percentage of moisture which condenses when coming in contact with a cooler body. The passing of air through a tile drainage system, which includes the open space between the soil particles which are opened through the action of tile drainage, is a well defined operation and can be readily observed.

Drains Supply Moisture

"At the close of a warm day, air enters the tile outlet, and, flowing through the tile, enters the subsoil through the tile joints. This subsoil being cooler than the warm, moist air entering through the minute openings, condensation takes place and thus *i*. supply of moisture reaches the plant root by means of circulation of air in dry weather.

"When it becomes understood what an immense amount of water, which is estimated to be 36 tons per acre on warm, windy days, is evaporated each day at the surface of the ground, it becomes clear that it is vitally important to prepare the subsoil by drainage to store all the moisture possible in available form for plant growth, and to conserve it during the cultivation period by frequent cultivations until such time as the crops shade the ground and preserve the open condition which prevents evaporation."

There is little nourishment in pasture grasses nowadayo. Winter feeding should begin in real earnest in the next few days.

FARM AND DAIRY