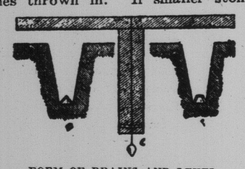
INEXPENSIVE DRAINAGE.

The Method Clearly Demonstrated—How to Do the Necessary Work at Small Expense.

Quite often tile drains do not come up to expectations. The term of their usefulness is much shorter than the durable nature of the material out of which the tile are made would indicate, In soft or quick-sandy ground they are apt to get out of line. At places the line of the drain may come near the surface. At such places and at the outlet, tile are apt to be crumbled by freezing, unless they are vitrified, which adds much to their cost. In common with all kinds of drains they are, more or less, liable to become choked with roots or slit or injured by the presence of vermin. There is scarcely a farm but needs drainage and were it more generally known that wood or stones form a very respectable substitute for tile, perhaps there would be more improvements along this line. Doubtless many are deterred by the cost of tile, especially in more remote sections where freight rates are high, but it is in just such localities that the farmer has an abundance of the other materials for constructing drains.

Large stones, if they have to be removed from the fields, may be advantageously used. In this case the ditches have to be dug wider at the bottom and require the removal of more earth. A row of stones should be laid on each side of the ditch bottom, leaving an open space through the middle which is covered with flat stones and then plenty of smaller ones thrown in. If smaller stones



FORM OF DRAINS AND LEVEL.

for filling are not to be had, straw or some waste material should be placed in before the dirt is thrown back.

A board drain is quickly made and when carefully laid with durable wood, is very lasting. Oak and chestnut are the most durable of our northern woods. Chestnut is easily rived, and rived boards last longer than sawed. Cypress rives easily and when placed under the ground where it is wet all the time, almost indestructible. The earth becomes packed around the boards which being where they receive no blows or jars retain an open passage for water long after the material begins to decay. A board six inches in width should be nailed to one of the same dimensions, and of any desirable length, and laid along the bottom of the drain like an inverted trough at a. If the material is rived and there are some narrow boards, the narrow ones may be nailed over two others as shown at b.

The ditch need not be over a spade's width at the bottom. Its depth is altogether a matter of circumstances. In draining out low places you have to cut the surrounding land deep enough to get the minimum of fall. This minimum of fall for a board drain is greater than for round tile, and may be set down as about three inches per 100 feet of drain. The deeper the drain the farther it will drain, but it is not thought to be of advantage to make very deep drains in stiff clay soils. In these kinds of soils the drain will not do its best at first, but will improve with years—the ground gradually becoming more porous. Two feet for stiff clays and three feet for lighter soils are good depths to work to. In laying the boards, have them fit closely and cover any holes with small pieces of boards, so the dirt cannot get in. Be sure to stop up the outlet with coarse wire screening, so as to keep out rats, rabbits, etc.

In laying drains with boards it pays to have the bottom even and straight as possible and the grade uniform, otherwise the dirt bottom may wash out or fill up in places. In getting the grade the assistance of an engineer is sometimes advisable, but I will describe below an instrument which a farmer of ordinary ingenuity can make at home and with it do his own grading. Many practical ditchers make use of water in the bottom to dig by, and where there is plenty of fall for short distances this does very well. But sometimes there is no water and experience has taught that in digging by water the ditcher will get a large fall, and oftentimes it is of the greatest importance to get the minimum of fall.

Take a straight pine board six feet three inches long, as shown at c, and fix it in the centre and at right angles another board one-half as long. At ends of long arm fix sights and from the centre suspend a plumb bob with string thread. The apparatus can be fastened to a Jacob's staff with a thumb screw and clamped in any position. When the instrument is clamped so that the thread coincides with zero on the scale, then the sights on the long arm will be level. The scale is divided by lines one-sixteenth of an inch apart. When the instrument is moved so that the thread covers one space, the line of sight will correspond to a grade of two inches to 100 feet. When moved two spaces from zero the line of sights will correspond to a grade of four inches to 100 feet, etc.

Ferns as House Plants.

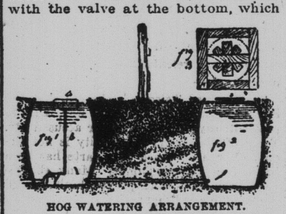
A well-grown, thrifty fern makes a beautiful house plant, but delicate and tender kinds are not suited for parlor or sitting room. One great advantage of ferns as house plants is that they do not require—in fact, do not like—much direct sunshine, although they do require plenty of light. The majority of ferns thrive best in a compost of turfy loam, old leaf soil and loam, anh some sharp sand. Gross-growing ferns are benefited by a little manure. If sufficient drainage is given they can hardly be over-watered, but the most important requirement of ferns is to have them sprayed overhead two or three times a week.

WINTER HOG WATERING.

A Non-Freezing Arrangement That Is Not Hard to Make.

The hog waterer illustrated is a home-made affair, but is superior to any patent trough or waterer I ever saw. Its cost is but little. It is made of two barrels, Figs 1 and 2, a section of piping, a tin float and a valve that can be bought at any hardware store.

The barrel, Fig. 1, receives the water from the well. It is set into the ground with the rim just above the surface. The float, (a), can be made by a tinner and should be of galvanized iron so that it will not rust out. It should be about 10 inches in diameter and 4 inches thick. An iron rod, (b), is fastened to the bottom of this float and connects with the valve at the bottom, which



HOG WATERING ARRANGEMENT.

closes the supply pipe when the barrel is filled. The escape pipe, (c), leads from this barrel to the watering barrel, Fig. 2. It will be readily seen that the water in the barrels, if they are set on a level, will remain the same.

For the top of the watering barrel, bolt 2x4 blocks together, as shown in Fig. 3. This will give the hogs and pigs free access to the water without any danger of the smaller ones falling in and being drowned. The supply pipe and also the pipe leading to the trough from the barrel containing the float will be far enough below the surface to prevent freezing, and it will be found that there are few nights cold enough in winter to freeze the watering barrel if it is placed so deep in the ground that not more than an inch or two projects above the surface. The other barrel, which can be placed outside the pen, can be protected by banking with straw or manure and hay. The supply reservoir must be higher than the barrels, a large tank being suitable. The pipe where it leaves the tank enters the ground at once and can readily be protected from freezing.

The Best Farm Manures.

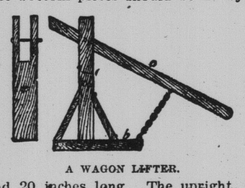
Manure from horses I regard as worth twice as much as that from cows and hogs, says a correspondent in Orange Judd Farmer. Give the horses plenty of oat straw and let this become fully saturated with their urine before throwing out. This makes the best of all manures for all purposes, but this should not be allowed to heat and burn in piles. Manures of less value, such as cow and hog manure, wood ashes, decayed vegetables, shavings, leaves of trees, in fact any rubbish that will rot can be mixed in with the horse manure, the whole being forked over several times to get well mixed. It is generally best to spread manure in the fall and plow in. Coarser manure can then be used than if delayed until spring. Where manure is to be used as a top-dressing for grass, clover and strawberry beds it is also best to spread on in the fall, as it affords protection to the roots of the plants.

Now, this matter of the value of manures, when and how to apply, is a matter that the farmer must study out largely for himself, being guided by soils and the crops desired. No one rule will hold good for all conditions or crops. But in nearly all cases the manure should be pretty well rotted and mixed in the soil before seeding. Stiff soils with a clay subsoil will retain manure much longer than any other soils. Sawdust, although highly recommended by some, has but little value as a manure. Coal ashes also have but little value, though if mixed equally with wood ashes will make a splendid top-dressing for currant and gooseberry lands, especially if the land is a stiff clay soil.

With many advantages possessed by the western farmers for improving and keeping up their lands to the highest state of cultivation, there is no excuse for poor or thin lands nor any reason why we should nor grow good crops for generations to come. But the time has come when we must begin to look after these matters, for it is much cheaper to improve good land than build up a poor worn out soil, There is no soil, no matter how rich, that will stand repeated cultivation without becoming exhausted. We cannot take from the soil all the time and give nothing back.

Another Wagon Lifter.

The illustration shows a cheap wagon lifter which anyone can construct. The lever, a, is four feet, while; the upright is 4½ feet long. The bottom pieces should be 2 by 8



A WAGON LIFTER.

and 20 inches long. The upright, e, is mortised at the top and receives the lever a. After the wagon is raised it is retained in position by means of a chain which is fastened to a hook in b.

Cost of Keeping a Hen.

The average cost of keeping one hen one year I have found to be about $1. Some varieties may run under this figure. But I have yet to find a hen that, if cares for as she should be, and if care and attention are paid to buying her food, will consume more than can be bought for this amount in 12 months. The average egg yield varies with different varieties, and should average 12 to 15 dozen eggs per hen per year.

HORSELESS PLOW.

An Invention Which May Yet Drive That Noble Animal, the Horse, From the Farm.

Jacob J. A. Morath of Clayton, St. Louis county, Mo., has invented an automobile plow. It is in effect a traction engine, but it is more. A traction engine must have level ground to move on. It must be hauled up a grade. The Morath plow can not only ascend a grade without trouble, but it can plow up the side of a hill. This fact has been demonstrated on the soil of St. Louis county, says The Post-Dispatch. Therein lies its superiority over everything in the line of a steam plow. Therein lies its claim to success.

The feat is made possible by the invention of a peculiar form of what may be called an auxiliary wheel, which, by a spiral or screw arrangement, digs into the ground and at the same time exerts a lifting force, which drags the whole machine forward and upward.

This invention cost Mr. Morath 17 years of time. The construction of the plow itself seemed simple enough and gave him but little trouble. How to obrain a driving force that would impel the machine over any kind of rough ground or over a hillside after the motive power was applied was the problem.

For 15 years Mr. Morath thought and experimented at his leisure. Two years ago he tackled the problem in earnest. Day and night he sought a method of solving it. A thousand experiments he tried and finally he lighted upon the device he has since employed.

One of his sons stuck a spade in the ground and held it firm. Around this was thrown a rope running through a pulley and attached to a

AUTOMOBILE PLOW.

plow. While another son pulled on the rope Mr. Morath observed the effect of the tension on the spade. He saw that, while there was a force which sunk the spade deeper into the ground, there was also a force exerted on the pulley which tended to drag it forward.

This force came from the end of the rope being pulled.

This situation then presented itself: This force corresponded to the motive power of the machine he had in mind. If this force could be so utilized as to urge the machine forward, why could it not be made to give the wheels a firm hold on the ground, the missing climbing and plowing force he so desired, if the proper connection could be made?

The device which he finally perfected is simple enough, but the mechanism is complicated. The forward and upward motion is obtained by means of certain chains and levers connecting with two sets of rotary bars to which are welded steel flanges of curious shape. When these bars are not in use, they can be raised so as to have no contact with the ground. When it is necessary to go over a piece of rough land or to climb a hill, they can be lowered by means of a lever. This sets in motion a set of machinery specially devised, and instantly the four sets of flanges, like the arms of a turbine wheel, commence to dig into the earth and to drag the plow forward, on the principle of Mr. Morath's experiment with the spade and rope.

This device, the first one of the kind ever invented for such a purpose is fully covered and protected by the terms of Mr. Morath's patent.

"This agricultural machine is simply a substitute for the farm horse," says Mr. Morath. "It can be hitched to a harrow, a seeding machine, a cultivator, a roller, a harvesting machine or almost any farming implement used in the field.

"Since the pulling power does not depend upon the weight of the machine, as in the case of a traction engine, the automobile plow can be built so small as to be of use for truck or garden farming. For the same reason it can be made big enough for use in a field where thousands of acres are to be plowed.

"Owing to its peculiar construction, it will work as well on hilly land as on level. For this reason it is as well adapted to use on the hills of Missouri as on the prairie farms of Illinois and the west. No other invention can claim this advantage.

"The plow attachment is so arranged that it can be raised when passing along a road or from field to field so as to prevent contact with the ground. It can also be raised to pass over a stump or other obstruction in a field. In fact, the principle of the automobile plow is so simple and the machinery so strong that any intelligent man can handle it without difficulty. There is little danger of breakage. All that the driver has to do is to take his seat on top of the plow, which is about as high as a wagon, see that the fuel is sufficient and that the heat is regulated and look out for dangerous obstructions. In going up a hill all he has to do is to regulate the machinery to place the auxiliary wheels in contact with the earth. The power behind the wheels does the rest."

A New Fungicide.

In some French tests a fungicide composed of three pounds of copper sulphate, five pounds of copper carbonate, ¾ ounce of permanganate of potash dissolved in a pint of water, and 100 quarts water, is said to have given as good results as the same quantity of bordeaux mixture, and has the advantage of adhering to the foliage better.

What Feed Value Depends On.

The value of food depends upon its composition, its digestibility and its palatability. All this must be taken into consideration when figuring out the rations for farm stock.

DITCH SHOVELING.

A New Wrinkle That May Make Old Style Work Easy.

Here is a new wrinkle about so simple a matter as shovelling dirt into a ditch. You thought you knew all about that job before, but you didn't know this idea. The scheme is to turn the shovel over, having a man on one side of the ditch to push the shovel and on the other side of

NEW METHOD OF DITCH SHOVELING.

the ditch to pull the shovel by means of a pole fastened by a wire to the base of the shovel handle. The picture makes it very plain. The old ditcher who got up this idea finds it a great help, especially where the soil is heavy. He is a man who does ditching by contract, and who therefore knows what he is talking about. He says that two men working in this way will accomplish as much as three men working with shovels in the ordinary manner.

Necessity of Gravel.

A farmer having a large flock of chickens about his barns and feed lot wished to improve the stock so sent to a reliable breeder and purchased two pure-bred males. They were fine birds and the gentlemen did not regret the price he paid in securing them. He turned them out with his other chickens and gave them no further attention. In a few days he noticed that they did not seem to be doing well, that they were less active than his other chickens in seeking food. He then made a point of feeding them regularly, but still they drooped and at last one of them died. He thought he would try to find out the cause of its death and did so. Upon opening it he found the gizzard and the passage leading to it filled with undigested matter. It was hard and baked, and the organs were much distended. Upon examining the material closely he found that there was a total lack of all grinding matter. There was no sand, gravel or stones in the mass. He felt that he had found the cause. The other cock was so far gone that he had little hope of saving him, but went immediately and got a box of pounded clam shells and gravel and set it before the bird. It commenced picking at it immediately and in a week's time was as healthy as ever.

The birds had been always penned up and fed, with a box of grit furnished them to run to whenever they needed it, and when they were turned out to rough it with the other fowls they did not know where to find the grinding matter. Had a box been furnished them both would have lived. It is well to have a pile of sand or a box where a supply of grit is kept for the fowls to run to, even where left to run at large. Old broken dishes and crockery pounded fine is the best kind of stuff for chickens.

FASHION 5218.

The Wonderful Aged Sow That Took First at London in 1899.

Fashion, 5218, 1st prize aged sow at London, 1899. Of immense size, weighing 800 lbs. in September last. She nursed a litter of 12 pigs in

FASHION.

April last. She is of great length and depth, and has a beautiful head, as shown by cut. The property of T. A. Cox, Brantford, Ont.

Distention and Rupture.

Distension and rupture of the stomach usually arise from too much food imperfectly masticated, or from the horse being put to collar work immediately after a heavy meal. The symptoms are abdominal pain, eructations of gas and food, fetid breath, profuse perspiration, cold legs and ears and great prostration. The animal sits on its haunches like a dog. The treatment (of the former disease) consists in diffusable stimulants, such as ether, ammonia, oil of turpentine, whichever is nearest at hand, always given in linseed oil, accompanied with brisk rubbing with a brush or wisp of straw over the abdomen and enemas of warm water and soap by the rectum. If the latter disease no treatment is of any avail.

Science of Winter Feeding.

Feed the cattle, dairy cows and all, plenty of good fodder; it is a roughage without a superior in the fodder kingdom, and the rougher the better. Grass is short now and winter feeding will be inaugurated at once. Remember, the modern live stock grower feeds for a purpose; if he is preparing animals for beef he feeds rations that will fatten; if for milk he gives a milk-producing diet, if for bone and muscle he metes out clover hay, bran, oats and the like. Let us have a good reason for feeding certain rations, and better results will come from efforts in this direction.

Care and Feed of Horses.

The stomach of horses and mules should not be overloaded. They should not be fed immediately before starting on a long journey, and moldy corn should always be avoided. Feed three times a day each from a separate manger. The amount needed by each animal can only be determined by observation. Corn and oats mixed with plenty of good hay and fodder with an occasional bran mash will keep the animals in good condition.

PROFIT IN HOME-MIXING.

What Lack of Knowledge About Fertilizers Costs Some Farmers—Hints to Prevent It in Future.

Mr. Geo. A. Smith gave at an Institute a good illustration of what lack of knowledge about fertilizers cost some farmers. Mr. S. is connected with the New York Experimental Station and knew about this case. A farmer bought some fertilizer for $20 a ton. This is not a high price per ton to pay, and doubtless the purchaser considered that he was making a good bargain. On the bags was this analysis: 1 to 2 per cent. nitrogen; 6 to 8 per cent phospheric acid; 1 to 2 per cent. potash. Now, when it says on the bag 1 to 2 per cent. of nitrogen, 1 per cent. is all the manufacturer guarantees. The addition of the "2" is simply to deceive, making you think that there may be 2 per cent. sometimes, or about 1½ on the average. You may rest assured that no dealer will put in more than the law requires, and that is the amount indicated by the lowest figure. And in the same way you can only reckon on 6 per cent. of phosphoric acid. and from the statement above you do not know as that is available, but we will suppose it to be. Mr. S. said the farmer could have bought the nitrogen for about 14 cents a pound, available phosphoric acid for 4 and potash for about 4½c. Then a fertilizer of the same value as the ton of mixed goods he bought would have cost him as follows:

20 lbs. of nitrogen @ 14c.	$2.80
120 lbs phosphoric acid @ 4c	4.80
20 lbs. potash @ 4½c.	.85
Total	$8.45

One per cent. of nitrogen of course means one pound in 100, which is 20 pounds in a ton; 6 per cent. of phosphoric acid is 6 pounds in 100, or 120 in a ton, and 1 per cent. of potash is 20 pounds in one ton. You see this is a very simple matter when you understand about it. The farmer could have bought the materials to make his ton of fertilizer for about $8.45. Then he could mix them on the barn floor with a shovel and sand screen just as well as any manufacturer does it. In fact, much of their mixing is done by men with shovels in just the same way. Fifty cents would pay for the mixing. Then the farmer has saved $11 on a ton and is more sure of getting a fertilizer that is worth what it should be. This is what the P. F. has been urging the farmers to do for several years. It wants them to save that $11 a ton, more or less.

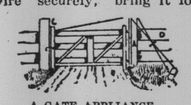
If you have been in the habit of using ready mixed fertilizers, why not send to your Station for bulletins explaining about this matter and stop paying so much for your plant food. A few years ago it was not easy for one to get materials for mixing. Now most dealers in fertilizers will furnish them. This is a move in the right direction and it is steadily growing. The fertilizer manufacturers recognize this and are reducing the price of ready-mixed goods and selling nitrogen, phosphoric acid and potash when you won't take the mixed goods. In the past you have often been told by Prof. Massey and the writer just what to buy to get nitrogen, phosphoric acid and potash. — T. B. Terry, in The Practical Farmer.

Plenty of Winter Eggs.

By using the very best laying hens as breeding stock from year to year, the laying quality of the flock can be greatly increased and in some instances doubled. As a rule pullets are much better than old hens, and it's a rare case for hens to produce more eggs than their daughters. I used to think that the earlier I could hatch chicks the more chances I had in having winter layers, but have learned from experience that April and May are the months to get out the birds that will help to fill the nests with nice eggs, when they are in great demand. A good, warm house should be provided, with a scratch shed where the birds can have plenty of room, and where a lot of fresh dirt from the field has been thrown in without packing. The morning meal should consist of a warm mash, one part middlings and two parts bran, scalded and steamed for at least 30 minutes and thoroughly mixed so that it is as stiff as it it can be stirred. Only a light feed of this should be given and the mash may include boiled turnips, potatoes or other vegetables. After breakfast a handful of millet seed should be scattered in the straw or leaves that have been placed in the scratch shed, and the day's work begins. At noon, give them a light feed of wheat thrown in the scratch shed and throw over a few whole turnips, or, better still, hang up a cabbage head just high enough so that the hens will have to jump up to get it.

To Keep a Wide Gate From Sagging.

Five feet from hanging post A place a short post B slightly slanted; on far side of A, near top, nail end of wire securely, bring it loosely



A GATE APPLIANCE.

around B and up again to this side of the top of A. Nail there a stout staple not quite to the head, just so that the wire will move through it freely. Now bring end of wire through end post of gate C and clinch it. Midway between A and B place a short stick D between the wires and twist it a few times; this will tighten sufficiently to hold any ordinary gate. In a year or two if a little slack, a few more twists will remedy it.—Practical Farmer.

Cure for Poison Ivy.

If any be poisoned with poison oak or ivy while hunting nuts or getting wood, make a strong tea of chestnut leaves and wash the eruption with it two or three times. It is a sure cure and perfectly harmless.—Mrs. M. E. Bryan, in Practical Farmer.

HITCHING POSTS.

Ornamental Stepping Stones, Too, That Are Easily Made.

It is often a matter of difficulty for the women of the family and old people to get in and out of the farm wagon or carriage, especially if they be high. The old-time stepping blocks were excellent. Fig. 1 shows

FIG. 1.—COMBINATION POST AND STEP.

a combined hitching post and stepping block. The iron loop with a short chain for snapping into the horse's bridle or halter, keeps the animal off the grass back of the post and prevents gnawing. Fig. 2 is an

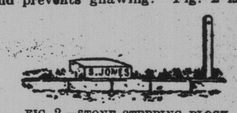


FIG. 2.—STONE STEPPING BLOCK.

ordinary stone stepping block placed at the side of the road. It bears the name of the owner of the farm. Fig. 3 is a wooden platform higher

FIG. 3.—WOODEN STEPPING BLOCK.

than the others, with two steps. This can be made stationary by driving posts into the ground and nailing the boards to them. The name of the owner can be painted on the front if so desired.

One Acre Garden.

A number of years ago the Rev. T. Shaw Chapman, of Marbleton, P.Q., says the Quebec Journal of Agriculture, retired from the Ministry of the Anglican Church in consequence of ill-health and amused himself with some scientific pursuits, among which was the care and management of one acre of land as a fruit and vegetable garden. The place was admirably adapted for the purpose, a gentle slope of upland maple soil, of good uniform quality. He planted a portion of this with apple trees at such a distance apart as to allow of cultivation of the land between the trees; he also planted a few of the best varieties of plums.

Some few years since, I had the pleasure of visiting Mr. Chapman and, seeing the possibilities of his work, I wrote to ask him to favor me with an account of the produce of his garden; he kindly replied as follows:

75	bushels	apples;
25	"	red plums;
7	"	black currants;
5	"	red and white currants;
125	"	swedes;
50	"	potatoes;
50	"	carrots;
5	"	blood-beets;
5	"	parsnips;

50 cauliflowers;
30 water melons;
300 heads of celery;
2 bushels of Indian corn;
Lettuce, radishes and pease enough for the family's use.

About 12 loads of rotted manure and 25 bushels of ashes are applied annually. Cultivation is chiefly by horse power.

Mr. Chapman adds: What has been done can be done again, and again. It is folly for any one to say that there are no profits or pleasure in gardening.

Horticultural Hints.

Cultivation of trees late in the season is harmful.

Care must be taken not to keep scions for grafting too damp.

All the sorting that apples require is when they are gathered.

There are few, if any, fruits, grown more readily than the grape.

The storing place for apples should be cool—just above freezing.

Applying salt around the fruit trees makes the plant food available.

When too large flower pots are used there will be more foliage than flowers.

Small trees will root better than larger ones, and young trees will start off in growth sooner than larger ones.

The soil in the orchard should be well drained, so that the roots will go down deep and lessen the danger from drought.

One of the best remedies for plant lice is strong tobacco water sprinkled well over the foliage and leaves; repeat if necessary.

Raspberries produce good crops for the same soil for years, but strawberries produce their best crop the first year after they come into bearing.

Spite of a Jealous Cow.

A strange piece of spite on the part of a cow is reported from Slough, says the British Dairy Farmer. The animal belonged to Mr. Johnson, a farmer, and on a valuable horse being driven in to the farmyard, the cow charged at it and inflicted such injuries that it died. A strange feature in the case is that after the cow had brought the horse down she appeared to relent, and while the suffering animal lay in the stable under treatment she was constantly at the door, and resented any attempt to drive her off. Mr. Johnson attributes the cow's strange conduct to jealousy, as the horse was often patted and made much of, and the cow was a young one which he had reared himself.

Advantages of Cherry Trees.

Cherry trees have many advantages over apples and pears in that rabbits seldom bother them and they are not as often affected by borers. The fruit comes at a time when there is but little other on the market and is consequently unusually profitable.