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# MEASURING THE ECONOMIC EFFICIENCY OF THE PRODUCTION COW'S MILKIN ABI- KARAQ DSTRICT

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## ABSTRACT

Milk and milk products are amsong the main sources of food since the production suffers from many productivity problems. The study aimed at Measure the effectiveness of the cows' fields performance by estimating the economic efficiency and their components. The sample was distributed at random on 19 fields in Abi karaq district, Babylon governorate; the sample represented 5% of the population. The study relied to achieve its objectives on the quantitative economic analysis, and in particular it relied on the data envelop analysis DEA ,which is based on linear programming to create an envelope containing data. The results indicated that the average capacity efficiency reached 0.76, and average technical efficiency reached 0.95 that meancan provide 5% of the resources without being influenced by the level of production. As the average allocative efficiency and cost efficiency reached (0.76, 0.73) respectively. Seven fields were technically efficient and not allocativly. The technical competency linked directly proportional with years of experience, while cost efficiency is inversely proportional to family size and directly proportional to the distance of grazing, also found that small and medium-sized fields was outperformed the large counterparts. The study recommended revised its production policy to increase production and reduce the cost by 27%, and the need for the establishment of dairy plants in production areas.

**KEYWORDS:** Economic Efficiency, Allocative Efficiency, Cow's Milk

## INTRODUCTION

The livestock is one of the most important sub-sectors of the agriculture sector because it contributes in operation of labor, as well as it provided basic products for consumption. The importance of livestock came from animal protein providing to humans. These products such milk which is considered among the important food sources in humannutrition. As it contains many essential nutrients that exceed what any other food stuff has (4). Milkproteins are highly energetic value and it is also lactose main source in the nature which is the important factor in the evolution of milk acidity and increase the absorption of calcium and phosphorus. Fatmilk is also involved about 50% of the total milkenergy group, which is estimated at 5.975Migacal/kgmilk(2). The provision of livestock products is among of problems that faced by many countries in the world because of its growing demand for its high nutritional value and its contains of essential nutritional compound and elements to human life and health compared tovege table products. After the spread of education cultural and health a wareness among individuals increased coupled with the increase inper capita income that made its priority as human favorite sources. But the continuo us population grow thled to an increase in the gap between what are available of market supply and the actual need, that makes the competition in a continuous increase (3). What is available of lives tock products on the Earth's is concentrated in developed countries, especillay the United States, Europe, Australia,

New Zealand and South Africa, the countries where scarce in so called Third World countries, including most of the countries of the continent of Africa, the Arab countries and other developing countries in Asia, that forcing most of them to import what they need from countries where those products are available. But poor countries, remain suffer from a lack of resources and the demand of them remains high. Iraq produces sizeable amounts of milk, but low production fills only a part of the population needs. Therefore, Iraq remained a net importer of most dairy products over the past decades and this will continue if it does not re-consider the policy toward the agricultural sector in general and especially livestock sector. The number of Iraq's population is growing noting that in the seventies Iraq is not up to 15 million people, while milk production in about 320 000 tons, after nearly forty years Iraq's population has become about 27 million people, while milk production did not exceed 400 thousand tons, in other words, the share of the Iraqi individual about 70 kg, an increase of 60 thousand tons only, while Iraq's population increased by nearly doubled. We note from that the gap is growing with comparing milk production over the past decades.(6).

**Search Problem**

The per capita share of milk products and derivatives less than global rates required by the proper and healthy nutrition as well as the instability of prices proportion and stability of proportion to the amount of fluctuation of production. Usually, the dairy projects also suffer marketing and industrial problems, including post-production for consumption are as and the consequent obstruction of the flow of milk and its high costs for correlation sector generally abundant grassland of effort traditional production systems on the other hand , as well as that fresh milk is a necessary commodity that cannot be provided through him port as the milk is perishable commodity there fore require studies that will raise the efficiency of use of available economic resources in this area to Continue ensure optimal production and use of important resources required for milk production at the lowest point of the average cost.

**Search Objective**

The study mainlyaimed at measuring performance effectiveness of the cows' fields through :

- Measuring economic efficiency and its technical and allocative branches.
- Determine the amount of resources achieves economic efficiency and guess the surplus and the deficit in the economic resources used incows breeding projects.

**Data Source**

Data were obtained from field sources using a question nairepreparedfor this purpose, randomly collected from19cows' fields of (milk production) in the province of Babylon, Abu Karaq district. noting that the sample represented 5% of the studied community.

**Research Method**

The study relied on the quantitative economic analysis to achieve its objectives and specifically relied on the technique Data Envelopment Analysis, where by estimate economic efficiency and its subsidiaries technical competence and allocative efficiency according to the combination of resources used, despite that there are two trends in this analysis, but was relying on enter guidance according to the concept of stability and change the yield of the commodity according to the concept of the stability and change of the product revanue allowing assessment of technical efficiency, the deficit or surplus in the value of economic resources have been calculated from the following equation :

The amount of the surplus or deficit in there source=the amount of resources at the lowest point of the average cost -amount of resources used If this difference is positive, it represents amount of the reduction in the amount of resources, but if it is negative, this amount represents the amount of increase in the amount of resources.

## RESULTS AND DISCUSSION

### Model Characterization

Efficiency indicators was obtained through data envelopment analysis software v2.1 on sample data, DEA enter guidance used in calculating the technical efficiency for the fixed and variable size returned, this guidance explains that the goal of the decision-makers is to use the least amount of production elements to provide a certain amount of product (5,7). Return size of production property was excluded because this property is appropriate only when all the comparison facilities operating in the optimal level of size because in fact there are many barriers especially in agriculture, and agricultural facilities hamper the achievement. such incomplete competition and that the using of assumption CRS result in confusing between technical efficiency and volumetric in dicatorsin other words, if the amount of production elements increased lead to a certain percent age increase greater or less or equal to the production size(8) . Asset of inputs has been tested, represented, green fodder (kg), concentrate fodder kg (bran), Veterinary medicines (mg), handiwork (hour). Out putrep resented by the amount of milk (kg). After this characterization and formulation of the modeledgrees of efficiency and yield can be display in the following form:

### Technical and Scale Efficiency

Returns to scale for any production unit can be determined by measuring the capacity efficiency the main reason for this approach is that economies of scale can be setdirectly efficient and inefficient productive unit (9). Measuring efficiency scale require, measuring technical efficiency under constant and variable returns to scale in other words, the scale efficiency of the production unit represent the ratio between technical efficiency of the production unit under the stability return to the scale and the technical efficiency for the same production unit under the change of scale return and when note the results of efficiency in the table (1) find it ranged between (0.34 -1) and an average (0.76) that means the sample can increase its production by 24% Until reach the right one that means getting the size optimization or access to the lowest point on the curve average costs in the long run, we also find that(26%) of the sample fields have achieved full efficiency and It can continue at current combination of elements this means that the total production increasing at the same amount of variable production factors added, in this case the rate of increase was fixed while we note that 14 field which rate 73.6% of the sample were operating increasing revenues size, 21% operating decreasing revenue size. As for the technical efficiency it is clears that12 fields achieve optimal technical efficiency amounting to100% and it is the highest value the technical efficiency reached and accounted for about 63.1% of the sample fields, this means that these fields are able to maximize production of milk for a specific number of inputs and thus the occurrence of these farms on the possible production curve and on these fields follow the same method used to maintain their resources productivity; The less value of technical efficiency was (0.83) so these fields should produce much of the current output or more using only 83% of the current input used to reach optimal efficiency, in terms of average technical efficiency can achieve the same level of current output using (95%) of all the inputs which means the availability of5% of the resources without affecting the level of production and we note that there is a difference between degrees of technical efficiency obtained under the stability or variable returns to scale, and this is attri but able to the fields that suffer from lack of capacity efficiency which equivalent to the difference between the degrees of efficiency that may be due to poor conditions surrounding the production unit.

**Table 1: Scale Efficiency and Technical Competence under the Change Stability Return to Scale**

| Farm | TE under Crste | TEUnder Vrste | Scale Efficiency | Farm | TE under Crste | TEUnder Vrste | Scale Efficiency |
|---|---|---|---|---|---|---|---|
| 1 | 0.312 | 0.905 | 0.344 | 11 | 0.735 | 1 | 0.735 |
| 2 | 0.368 | 0.889 | 0.414 | 12 | 1 | 1 | 1 |
| 3 | 0.534 | 0.828 | 0.644 | 13 | 1 | 1 | 1 |
| 4 | 0.917 | 1 | 0.917 | 14 | 0.581 | 1 | 0.581 |
| 5 | 1 | 1 | 1 | 15 | 0.776 | 0.94 | 0.826 |
| 6 | 0.814 | 1 | 0.814 | 16 | 1 | 1 | 1 |
| 7 | 0.612 | 0.913 | 0.67 | 17 | 0.458 | 1 | 0.458 |
| 8 | 0.613 | 1 | 0.613 | 18 | 0.755 | 0.897 | 0.842 |
| 9 | 0.687 | 1 | 0.687 | 19 | 1 | 1 | 1 |
| 10 | 0.746 | 0.839 | 0.889 | MEAN | 0.73 | 0.95 | 0.76 |

**Source:** work of rsearcher based on the results of data envelop analysis.

**Allocative and Economic Efficiency for Farms Sample**

The estimate of technical efficiency of farms sample in case of lack of information on resources used in production and its prices the efficiency index in this case cannot take into account the actual cost of resources hence need to develop the style of the efficient use of economic resources analysis which includes the cost of resources and it can therefore be compared to the technical efficiency that calculate estime to measure the scale efficiency and again to measure cost efficiency(10). Table 2 shows that all ocative efficiency ranged between (0.37) and correct one and an average of (0.76) this result is relative lylow indicate a size able potential for fields managers to increase their production of milk. This means that the re-distribution of resources will provide 24% of the production cost while maintaining the current production level, this value take us to the point of contact between the equal output curve and line of cost. This result is low in compare with technical efficiency indicator. The total fields that have achieve deficiency particular is tic 100% amounted to 5 Farms accounted for 26% of the total sample fields that is, these farms do not have a deficit or surplus. The results also indicated that seven fields were technically efficient but it is not particularistic this is due to the introducing of price and technological only, either cost efficiency which is the product of the technical efficiency time (E)all ocative efficiency averaged(0.73) fluctuated between (0.73 -1) this means that the cows fields can achieve the same current level of milk production under the cost reductionby27% and mean able to produce the current level by using only73% or less of economic resources.

**Table 2: Technical and Allocative Efficiency and Cost Efficiency**

| Farm | TE | AE | CE | Farm | TE | AE | CE |
|---|---|---|---|---|---|---|---|
| 1 | 0.905 | 0.686 | 0.621 | 11 | 1 | 1 | 1 |
| 2 | 0.889 | 0.591 | 0.525 | 12 | 1 | 1 | 1 |
| 3 | 0.828 | 0.83 | 0.688 | 13 | 1 | 0.379 | 0.379 |
| 4 | 1 | 0.754 | 0.754 | 14 | 1 | 0.922 | 0.922 |
| 5 | 1 | 1 | 1 | 15 | 0.94 | 0.787 | 0.74 |
| 6 | 1 | 0.679 | 0.679 | 16 | 1 | 1 | 1 |
| 7 | 0.913 | 0.931 | 0.851 | 17 | 1 | 0.529 | 0.529 |
| 8 | 1 | 1 | 1 | 18 | 0.897 | 0.506 | 0.453 |
| 9 | 1 | 0.705 | 0.705 | 19 | 1 | 0.59 | 0.59 |
| 10 | 0.839 | 0.607 | 0.509 | MEAN | 0.95 | 0.76 | 0.73 |

**Source:** work of rsearcher based on the results of data envelop analysis.

In the division of economic efficiency and their components to different levels show that most of the sample fields produce higher levels of80%. This is a good indication that breeders are relatively able to adjust blending lements of

production technically. But when the introducing of price and technology, and because of high prices of resources that are often purchased from markets in the absence of government support on the one hand and low out put prices on the other hand it was noted that 63% of the studied fields produce at levels of economic efficiency, less than80% . As it turns out through the questionnaire that most breeder first goal of breeding cows is to prsoducecalves and milk production thus be a secondary production, Table number 3.

**Table 3: Levels of Economic Efficiency and their Components in the Study Sample**

| Levels | TE | % | Scale E | % | AE | % | CE | % |
|---|---|---|---|---|---|---|---|---|
| 100 | 12 | 63 | 5 | 26.3 | 5 | 26.3` | 5 | 26.3 |
| 80-99 | 7 | 37 | 6 | 31.5 | 2 | 19.5 | 2 | 10.5 |
| 60-79 | - | | 3 | 15.7 | 6 | 31.5 | 6 | 31.5 |
| Less than 60 | - | | 5 | 26.3 | 6 | 31.5 | 6 | 31.5 |

**Source:** searcher work depending on the results of the analysis.

**Economic Efficiency Relationship with Some Variables**

By examining the relationship between economic efficiency and its components with some variables and after the division of the sample fields into different sizes show that there is a direct correlation between the technical efficiency and capacity efficiency and the size of the herd on the other hand, this directly proportional relationship between the cost and allocative efficiency continued to size30head, but after an increase in volume over 30 the relationship turned to inverse. Which shows the weakness of the financial potential and management skills. Most breeder have limited agricultural holdings which is reflected on the size of the planting for age or grazing are as. Table 4. Family size was showing positive impact on technical and capacity efficiency where small families made less technical efficiency of large counter parts. The economic logic also acknowledges the existence of a direct correlation between years of experience and levels of efficiency, because of the experience gained by doing an integral part of the administrative work. Increase years of experience in crease he amount of production and then one of efficiency condition achieved and this has been achieved in this study. When studying the effect of grazing distant for housing show that there is a direct correlation where an increase of about 250m distance increases efficiency and shows why that in crease of distance means availability of pastures and provide a reliable alternative to the feed and thus reduces cost. Table 5.

**Table 4: Economic Efficiency and its Components Relationship with the Size of the Herd**

| Size of the Herd/ Head | Capacity Efficiency | Technical Efficiency | Allocative Efficiency | Cost Efficiency |
|---|---|---|---|---|
| 11-20 | 0.73 | 0.88 | 0.79 | 0.78 |
| 21-30 | 0.79 | 0.91 | 0.81 | 0.79 |
| More than 30 | 0.94 | 093 | 0.76 | 0.74 |

**Source:** searcher work depending onresults of the analysis.

**Table 5: The Averages of Economic Efficiency and its Relationship with Some Variables**

| Variables | Scale Efficiency | Technical Efficiency | Allocative Efficiency | Cost Efficiency |
|---|---|---|---|---|
| **Size of Family** | | | | |
| **Small** | **0.71** | **0.91** | **0.81** | **0.78** |
| **Big** | **0.83** | **0.95** | **0.69** | **0.66** |
| **Years of Experience** | | | | |
| **1-10** | **0.56** | **0.95** | **0.72** | **0.72** |
| **11 and more** | **0.81** | **0.97** | **0.77** | **0.79** |

**Table 5: Contd.,**

| Grazing Distance | | | | |
|---|---|---|---|---|
| 300 m and less | 0.70 | 0.94 | 0.75 | 0.72 |
| More than 300 m | 0.80 | 0.96 | 0.78 | 0.73 |

**Source:** Searcher work based on the results of the analysis and the questionnaire form.

**Size of Resources Achieved Economic Efficiency**

This study adopted in the calculation of the amount of the surplus and the deficit in the economic resources used in production (Work, veterinary medicine, Green feed, crusty feed) on a comparison between the amount of resources achieved economic efficiency and the amount that has been used, in other words, The amount of the surplus and deficit=the amount of resources at the lowest point of the average cost - amount of resources used. If this difference is positive, it represents the reduction of resources amount, else if it is negative, it represents the amount of increase in resources amount that requires to supplied(1).

**1-The Amount of the Green Fodder Achieve Economic Efficiency**

It can be seen by comparing the amount of actually green fodder used in the sample with its counter part achieves economic efficiency, the feed intake amounted to 78170kg and an average of 4114.2kg, while quantities achieved economic efficiency amounted to 65715.4 and an average 3458.7 kg accordingly, the amount of surplus fodder amounted to 12454.5 kg of that achieved economic efficiency and an average of 655.5kg. Results indicated that fields have achieveda deficit of 15.7% of 5 fields accounted for 26.3%. The total sample has been able to balance the amount of actualfeed and achieved efficiency and did not have any extra resources.

**Table 6: The Amount of Green Fodder Used in the Sample and Achieved Economic Efficiency**

| The Amount of Green Feed Used | Quantity Achieved Efficiency | The Amount of Surplus or Deficit | The Proportion of Surplus or Deficit % |
|---|---|---|---|
| 2520 | 2880 | -360 | -14.285 |
| 5040 | 2880 | 2160 | 42.857 |
| 3960 | 3428.571 | 531.429 | 13.419 |
| 2520 | 3284.211 | -764.211 | -30.3258 |
| 6120 | 6120 | 0 | 0 |
| 5400 | 3114.217 | 2285.783 | 42.329 |
| 4680 | 2880 | 1800 | 38.461 |
| 2880 | 2880 | 0 | 0 |
| 4320 | 2880 | 1440 | 33.333 |
| 5760 | 3582.651 | 2177.349 | 37.801 |
| 2880 | 2880 | 0 | 0 |
| 7200 | 7200 | 0 | 0 |
| 4000 | 3582.651 | 417.349 | 10.433 |
| 2160 | 2880 | -720 | 33.333 |
| 2890 | 2880 | 10 | 0.346 |
| 2880 | 2880 | 0 | 0 |
| 3600 | 2880 | 720 | 20 |
| 3960 | 2880 | 1080 | 27.272 |
| 5400 | 3727.180 | 1676.819 | 31.051 |
| 78170 | 65715.48 | 12454.52 | 219.362 |
| 4114.211 | 3458.71 | 655.500 | 11.545 |

**Source:** searcher work depend on the analysis results.

### 2-The Actual Amount of Dry for Age That Achieve Economic Efficiency

When poring in Table 7 we see that cattle breeders used 132 347kg in an average of 6965.6kg for afield, and the amount of feed at the lowest average for all fields was 124548,7 kg with an average 6555.1kg and that the surplus was 7799kg with an average 410.4kg per field. We note that. 26.3% of the field shad a deficit and this shows the weakness of the financing ability of the fields.

**Table 7: The Amount of the Actual Dryfeed(Bran) Achieved Economic Efficiency in the Sample kg.**

| The Amount of Bran Used/kg | Quantity Achieved Efficiency | The Amount of Surplus or Deficit | The Proportion of Surplus or Deficit % | The Amount of Bran Used/kg | Quantity Achieved Efficiency | The Amount of Surplus or Deficit | The Proportion of Surplus or Deficit % |
|---|---|---|---|---|---|---|---|
| 5600 | 5400 | 200 | 3.571 | | | | |
| 9000 | 5400 | 3600 | 40 | 9000 | 9000 | 0 | 0 |
| 7200 | 6771.429 | 428.571 | 5.952 | 5760 | 7308.434 | -1548 | -26.883 |
| 6120 | 7042.105 | -922.105 | -15.067 | 5040 | 5400 | -360 | -7.143 |
| 9000 | 9000 | 0 | 0 | 6120 | 6046.154 | 73.846 | 1.206 |
| 9000 | 6996.145 | 2003.855 | 22.265 | 6840 | 6840 | 0 | 0 |
| 7200 | 5695.385 | 1504.615 | 20.894 | 3240 | 5400 | -2160 | -66.667 |
| 5400 | 5400 | 0 | 0 | 10800 | 6433.846 | 4366.154 | 40.427 |
| 5400 | 5916.923 | -516.923 | -9.573 | 5040 | 7402.12 | -2362.12 | -46.867 |
| 10800 | 7308.434 | 3491.566 | 32.393 | 132347.7 | 124548.7 | 7799.025 | -0.0555 |
| 5788 | 5787.692 | 0 | 0 | 6965.668 | 6555.193 | 410.475 | -0.00292 |

**Source:** Searcher work depend on analysis results.

### 3-Human Working Hours Achieved Economic efficiency:

Most of the operations and services provided to an animal managed by hand so the number of actual hours 172633.8 hour with an average 9085 hour per field while achieved economic efficiency amounted to116,282.6 hour in an average of 6120 hours per field. We note that all fields had a surplus of the work component because of the large size of the family and the rule of real agricultural production unemployment. Table8.

**Table 8: Hours of Human Labor Used Which Achieved Economic Efficiency in the Sample**

| Actual Working Hours/ Hour | Hours Achieved Efficiency | The Amount of Surplus or Deficit | Percentage % |
|---|---|---|---|
| 8640 | 5040 | 3600 | 41.666 |
| 9720 | 5040 | 4680 | 48.148 |
| 7560 | 5040 | 2520 | 33.333 |
| 7560 | 5355.789 | 2204.211 | 29.156 |
| 8640 | 860 | 0 | 0 |
| 8640 | 5968.193 | 2671.807 | 30.923 |
| 5760 | 5187.692 | 572.308 | 9.935 |
| 5040 | 5040 | 0 | 0 |
| 7560 | 5298.462 | 2261.538 | 29.914 |
| 12960 | 6384.578 | 6575.422 | 50.736 |
| 5234 | 5233.846 | 0 | 0 |
| 14400 | 14400 | 0 | 0 |
| 17280 | 6384.578 | 10895.42 | 63.052 |
| 5760 | 5040 | 720 | 12.5 |
| 7560 | 5363.077 | 2196.923 | 29.059 |
| 5760 | 5760 | 0 | 0 |
| 10080 | 5040 | 5040 | 50.00 |
| 12960 | 5556.923 | 7403.077 | 57.122 |

| | | | |
|---|---|---|---|
| 11520 | 6509.494 | 5010.506 | 43.494 |
| 172633.8 | 116282.6 | 56351.21 | 529.043 |
| 9058.992 | 6120.139 | 2965.853 | 27.844 |

**Source:** researcher work depend on analysis results.

**4-The Amount of Veterinary Drugs Achieve Economic Efficiency;**

The amount of veterinary drugs used in the research sample about 173.06mm, in an average 9.1 mm per field while the amount of medicine achieved economic efficiency amounted to181.7mm by 9.5 mm per field accordingly the amount of deficit was 8.6 with an average of 0.4 mm per field and the deficit in the sample \ was 42%, this shows the weakness of veterinary services because of lack of funding and a ware ness of the breeder on one hand and the weakness of veterinary device in these arch are a on the other hand.

**Table 9: The Amount of Actual and Achieved Economic Efficiency of Veterinary Medicines in the Sample**

| The Actual Amount of Veterinary Medicine/mm | The Amount of Medicine Achieved Economic Efficiency | The Amount of Surplus of Deficit | The Proportion of Surplus or Deficit | The Actual Amount of Veterinary Medicine/mm | The Amount of Medicine Achieved Economic Efficiency | The Amount of Surplus of Deficit | The Proportion of Surplus or Deficit |
|---|---|---|---|---|---|---|---|
| 9.7 | 9 | 0.7 | 7.216 | 10 | 10 | 0 | 0 |
| 9.9 | 9 | 0.9 | 9.090 | 9 | 10 | -1 | 11.111 |
| 10 | 9.762 | 0.238 | 2.38 | 8 | 9 | -1 | -12.5 |
| 11.2 | 10 | 1.2 | 10.714 | 10 | 9.449 | 0.551 | 5.51 |
| 10 | 10 | 0 | 0 | 10 | 10 | 0 | 0 |
| 8 | 10 | -2 | -25 | 10 | 9 | 1 | 10 |
| 8 | 9.205 | -1.205 | -15.062 | 9 | 9.718 | -0.718 | -7.977 |
| 9 | 9 | 0 | 0 | 8 | 10 | -2 | -25 |
| 8 | 9.359 | -1.359 | -16.987 | 173.069 | 181.762 | -8.693 | -135.394 |
| 6 | 10 | -4 | -66.666 | 9.10889 | 9.566 | -0.0712 | -7.125 |
| 9.269 | 9.269 | 0 | 0 | | | | |

**Source:** researcher work depending on analysis results.

## CONCLUSIONS

- The production costs used is more than the lowest point of the average costs curve by amount, which shows that the farmers do not have the ability to choose the right combination of resources, as production costsriseled to higher costs line which making part of the farms to be technically competent, and are not efficient particularistic, that an indication that there is a waste of resources rats.
- Efficiency varied de pending on the size of the herd and the cost efficiency for the production of milk in medium and small projects exceed on the big counter parts.

**Recommendations**

- Reconsidering output policy for the studied projects to increase output by24%. By the rational exploitation and optimization of production factors used.
- Provide funding for the production of milk to bring it to economic sizes, whether short term or long term and take advantage of some of the excess resources. Considering support the livestock sector policies, and try to create dairy plant in production areas.

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