THE PROFITABILITY OF CULTIVATION OF DOUBLE IMPROVED
VARIETIES OF RAPE AS A FODDER CROP

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The problem of profitability of rape cultivation is of importance not only for farmers but for the whole economy as well. In this study the problem in question is considered only from the point of view of national economy. The relative profitability has been analysed on the assumption that rape is competing for land with other crops. The profitability of cultivation of double improved varieties of rape has been compared with the profitability of wheat and bar - ley. All three plants have been treated as fodder crops. Therefore it has been necessary to assume that rapeseedoil is exported and the currency earned is used for some fodder imports. It has also been assumed that the costs of cultivation of all three crops are identical. The effectiveness of cultivation of any of the above mentioned crops depends in this case upon the " yields " of their nutritional components.

The basic methodological problem of the calculation presented is the conversion of most important nutritional components - protein and energy - into comparable units. The calculation has been made on the basis of a method used by Z. Grochowski / 1967 /. Its basic assumption is that there is a constant ratio between the value of a weight unit of protein / in this calculation digestible protein for pigs has been used as basis / and a unit of energy / in this case oat unit has been used /, irrespective of the nutritional value of fodder, its composition or production costs per unit. This constant ratio has been denominated by letter "r". Such an assumption makes it possible to convert protein and oat units into " conventional units " and to carry out necessary calculations. Following Grochowski, as a calculation unit has been used a " conventional feed unit " equal to oat unit. One kilogram of digestible protein is in this case equal to "r" number of conventional feed units. Therefore economic value of the feed equal the sum of oat u - nits and kilograms of digestible protein multiplied by a constant ratio / r /. The following formula may be used to demonstrate this calculation:

$$v = \sum f = a + br ; \qquad /\ 1\ /$$

where:

    v – economic value of the feed,

    f – conventional feed unit,

    a – number of oat units contained in the feed,

    b – number of kilograms of digestible protein
        in the feed,

    r – ratio between the value of one kg of digestible
        protein and the value of one oat unit.

As the values of "a" and "b" are known / they are included in the
tables of nutritional value of feeds / in order to ascertain the
economic value of the feed the "r" ratio must be established. It can
be calculated using prices of feeds on the international market in
long periods of time. In this study it has been calculated on the
basis of data for the period 1959-1984. In order to find the respe-
ctive ratio two equations, each with two unknowns, have to be solved

$$a_1 x + b_1 y = c_1 \qquad /\ 2\ /$$
$$a_2 x + b_2 y = c_2$$

and after ratio:

$$\frac{y}{x} = r ; \qquad /\ 3\ /$$

where:

    1 and 2 denominate two different feeds

    a_1 and a_2 – number of oat units contained in 100 kg of
        feed No 1 and feed No 2,

    b_1 and b_2 – number of kilograms of protein in 100 kg
        of feed No 1 and feed No 2,

    c_1 and c_2 – prices of feed No 1 and feed No 2 on the
        international market,

    x – price of one oat unit,

    y – price of one kg of protein,

    r – ratio to be found.

Two kinds of feeds of plant origin, dominating international trade,
are feed grains and oilseeds meals or cakes. As feed No 1 feed
grains have been taken and oilmeals as feed No 2.
Feed No 1 – consists of barley, maize and " cereals not elsewhere
specified " / in this last category sorgo is the most important,
and its nutritional value is applied also to other grains included .

in the group /. Its composition and feed value has been calculated
taking into account percentage shares of each category of grains
in total imports during the period considered.
Feed No 2 - oilmeals is composed of the following: soybean meal,
rapeseed meal, groundnut meal, cottonseed cake, linseed meal, sun-
flower-seed meal, coconut meal and palm kernel meal. It comprises
then 8 most important meals traded internationally. Its composition
has been calculated in a similar way as for feed No 1.
The prices of feeds No 1 and No 2 have been obtained by dividing
import values of all products included in the group by import volu-
me in the respective period. They represent therefore weighted ave-
rages.
Data on the world imports and prices of grains and oilmeals have
been taken from FAO Trade Yearbooks for several years.
The nutritional value of different products have been taken in ac-
cordance with the tables of nutritional value of feeds, which are
used by enterprises associated in " Bacutil ".
Above mentioned data served as a basis for establishing parameters
"a","b" and "c".Then the set of two equations has been solved, and
the result was that the value of "r" is 3,3. On the basis of this
ratio a comparison of the profitability of cultivation of wheat,ba-
rley and double improved rapeseed has been effected.
The calculation has been made using data and assumptions as follows:
The content of basic nutritional ingredients in 100 kg of seeds or
grains of the plants compared is as follows:
wheat   - 10,0 kg of digestible protein and 127 oat units
barley - 8,4 kg of digestible protein and 111 oat units
rapeseed- 50,9 kg of digestible protein and 152 oat units
The data for wheat and barley have been drawn from the tables of
nutritional value of feeds. For rapeseed calculation has been made
on the assumption that rapeseed oil is exported and proceeds used
for soybean imports.
Average export prices / fob / of rapeseed oil and average import
prices of soybean meal / cif / in the years 1981 - 1984 have been
calculated on the basis of FAO Trade Yearbook. It has been found
that exporting one kg of rapeseed oil provides money for the impor-
tation of 2,2 kg of soybean meal.

On the basis of the tables of nutritional value of feeds the content of nutritional components in 100 kg of two different meals is calculated as follows:

rapeseed meal - 29,5 kg of digestible protein and 95 oat units

soybean meal - 39,7 kg of digestible protein and 114 oat units.

The volume of nutritional components received from 100 kg of rapeseed is:

digestible protein - 0,57 x 29,5 + 0,39 x 39,7 x 2,2 = 50,9 kg

oat units - 0,57 x 95 + 0,39 x 114 x 2,2 = 152

Including above data to formula / 1 / we obtain following results:

wheat - 127 + 10,0 x 3,3 = 160 conventional feed units

barley : 111 + 8,4 x 3,3 = 139 conventional feed units

rapeseed : 152 + 50,9 x 3,3 = 320 conventional feed units

The above calculation shows that when taking the number of conven - tional feed units obtained from a unit of land area as criterion of profitability, wheat is equally profitable as rapeseed only then, when yields are twice as high as that of rapeseed. In the case of barley profitability equal to rapeseed is only assured when barley yields are 2,3 higher than yields of rapeseed . This calculation howewer does not take into account the value of straw. If straw value is included in the calculation / it amounts in the case of wheat 16% and in the case of barley 11% of the value of inputs / the above mentioned ratios should be lowered to 1,7 in the case of wheat and about 2 in the case of barley.

Taking into account average yields obtained in Poland / in the six years 1981 - 1986 average wheat yields amounted to 33,4 q, barley yields 31,0 q and rapeseed yields 21,3 q per hectar / and taking into consideration that yields of double improved varieties of rapeseed are 20% lower than of traditional rapeseed varieties, the profitability of double improved rapeseed varieties cultivation is / excluding the value of straw from calculation / equal to the profitability of wheat cultivation and about 30% higher than of barley cultivation.

Literature:

Grochowski Z. Metoda określania relacji wartościowych białka i jednostek pokarmowych w paszach. Zagadnienia Ekonomiki Rolnej. 1967. Nr 3, s. 55 -74.