CO1970MEAL07

PANEL DISCUSSION ON
RAPESEED MEAL UTILIZATION

PANELISTS: Monsieur M. Chanet,
Professor J. Biely,
Professor J.M. Bell,
Professor D.R. Clandinin.

INTRODUCTION BY PROFESSOR BIELY:

The animal and poultry industry of the U.S.A. is based on corn-soybean meal economy. The impetus for this development came during the Second World War, when animal protein concentrates became scarce. The characterization of various vitamins and particularly of vitamin B_{12} makes it possible to formulate all-vegetable rations which are as nutritious as those containing animal products. A vast amount of research in the U.S.A., Canada and Europe has been concerned with various aspects of corn-soybean meal rations. Literally hundreds of scientists in university laboratories and in industry are engaged in evaluating the nutritive value of soybeans for poultry and livestock feeding as well as human nutrition.

In Canada the livestock and poultry industry depends for its energy and some of its protein content on the white grains: wheat, barley and oats. In my opinion we have been inclined to underestimate the biological value of the protein of grains. However, here I must not dwell upon my favourite subject, but rather I must speak about rapeseed meal as a supplement to the white grains. The bulk of the research work on rapeseed meal has been conducted in the three Prairie provinces at the Universities of Alberta, Saskatchewan and Manitoba; at the Canada Department of Agriculture and Prairie Regional Laboratory of the National Research Council at Saskatoon.

The pioneering work, insofar as poultry is concerned, was carried out by Professor Clandinin and Professor O'Neil, two former students of mine. You have heard today from Dr. Clandinin and Mr. Ray Salmon, the latter also a student of mine and, comparatively speaking, a newcomer in the field of rapeseed research. The work of Professor Bowland of Alberta on pigs, Professor Bell of Saskatchewan, an expert on all aspects of rapeseed meal and oil research, and of Professor Ingalls and his group in Manitoba are known world-wide. They are a small band of pioneers who have seen the industry grow into a hundred-million dollar enterprise.

In recent years, through the efforts of the Rapeseed Association of Canada, research work has been undertaken at the University of Guelph by Professor Slinger and his associates, and at the University of British Columbia by Professor March and Professor Bragg. Dr. Ruth Renner of the University of Alberta has made a fundamental contribution to our knowledge of rapeseed meal by elucidating the nature of the carbohydrate portion of the rapeseed and its energy content. Today we have heard from our colleagues from overseas — Dr. Staron and Mr. Chanet from France, and Mr. Wiechmann from Germany. The world experts on rapeseed meal are fortunately present in this room. Feel free to ask them provocative questions, in order to clarify the present situation. Where do we stand today and what does the future hold for rapeseed meal as a livestock and poultry vegetable protein concentrate as well as a source of supplementary energy?

I am not an expert on rapeseed meal or oil. I am merely a consumer, inasmuch as I look for a dependable and cheap source of vegetable protein and oil as a supplement to grains which constitute 75-80% of the poultry ration. Professor March's work indicates that careful consideration should be given to supplementation of wheat-rapeseed rations with lysine, the first limiting amino acid in all-vegetable poultry rations. All-vegetable rations are here to stay! Rapeseed meal could make an important contribution to the total world pool of vegetable protein concentrates. Competition between soybean meal and rapeseed meal is highly desirable, whether one looks upon these two valuable products from a research point of view, or commercial utilization, and particularly from a consideration of costs.

I think the Conference has been a tremendous success. I hope you have benefited from the papers which have been presented during the past three days. I wish you bon voyage and a safe return home.

Who will volunteer to ask the first question?

COMMENT OF PROFESSOR BELL

Rapeseed meal like rapeseed oil is receiving a great deal of attention now, and has been in recent years. Rapeseed is assuming an ever increasing importance as both, a domestic and a world trade commodity. Rapeseed meal is a relative newcomer in feed formulation. It has been in the limelight at least in some parts of the world as a result of inquiries regarding its potential feeding value. We are learning how to process and how to use this product effectively in feeding livestock and poultry, just as we had to learn how to process

and use many of the other proteinaceous feeds, including linseed meal, cottonseed meal, soybean meal, fish meal, meat meal and even milk powders. The nutritional battles that have been fought and won all the way along the line with respect to high protein feeds would in itself provide a very interesting background for a conference. I think that perhaps we would do well to remind ourselves that nutritionists could probably fault every existing protein source in one or more respects. Our challenge now is to identify and describe the limitations and to assist in the alleviation of nutritional shortcomings, and to assist the user to merchandize the product to the best overall advantage.

1) QUESTION: The protein content of poultry rations varies a great deal, you have indicated that rapeseed meal should be used to the extent 5 or possibly 10% in the diet. Would it not be better to specify it in terms of protein content, say one-third or one-quarter or one-half of the total protein?

ANSWER: (Professor D.R. Clandinin)

I do not think it makes too much difference how you specify the level of usage. The way experiments have been set up in this country, some of them have been set up with the view of using say 5, 7½, 10, 15 and 20% and then we decided on a level that seems to be satisfactory. There have also been experiments set up where a specific percentage of protein has been supplied by the ingredient rapeseed meal. For example, I am thinking of an experiment that was set up at Guelph on those nine meals or eight meals that you saw in one of my slides where they supplied 10% of the protein of broiler chickens from these eight samples of rapeseed meal. This meant that the diets, in fact, contained about 25% rapeseed meal, and when the diets were made isocaloric and isonitrogenous, the broilers did equally as well on all of these meals as they did on the soybean meal control. I really don't think that it makes too much difference whether you put it in as 10% rapeseed meal that means 3.6 percent protein from rapeseed meal. I do not think that this is really too important.

While I am on my feet, I would like to say one thing about Mr. Wiechmann's presentation. I am a little concerned about the values that he had for swine. I think that the values which have been used by Canadian workers in the swine area are not in agreement with what I saw on his slide. For example, I think it is a recommendation for pigs from weanling age to about 25 kilos, that the diet should contain not more than 4% rapeseed meal and for growing pigs about up to 10%. I

ANSWER: (Professor D.R. Clandinin) (Cont'd.)

think they recommend that if those growing pigs are gilts and they are going to end up in the breeding pens, that they advise even lower levels than this, a level of around 5%. Insofar as the breeding rations are concerned the recommendation in Canada is not more than 3% in the ration of breeding pigs. While these levels are higher than the levels that were suggested for Germany, perhaps they are higher because of the fact that we have a different type of rapeseed meal in Canada than they have presently in Germany. Maybe we will be moving to that type of rapeseed meal in the next few years.

2) QUESTION: Dr. Clandinin, in looking at metabolizable energy for poultry rations and referring to the figure of 1,800 kilocalories now rather than the 1,300 that we had previously, does this mean, that this recent change in your thinking is based on some recent work that you have done even since the Symposium which we held in Guelph in April, 1970?

ANSWER: (Dr. D.R. Clandinin)

At the Symposium held in Guelph, we were speaking of 1,800 of kilocalories per kilogram, which is 800 kilocalories per pound approximately. The work reported at Guelph was on the eleven samples of meal that were used in the cooperative series, but only 9 appeared on that slide, because only 9 of those meals were done at the University of Alberta and the same 9 meals were done at the University of Guelph. That is why the other 2 meals were eliminated from the table.

3) QUESTION: A number of the speakers presented growth data, and their diets were said to be isonitrogenous. Yesterday or the day before we had a figure of 5.4 as a conversion factor for the nitrogen to protein basis. Now, I am wondering, in the case of these experimental data where we are evaluating the protein quality of our rapeseed meal, are we perhaps under-estimating the protein quality in the actual protein in the diet by using this factor, particularly since I understand that this factor was based on the non-protein nitrogen, i.e., this is a multiplication of the nitrogen after correction for NPN by the factor of 5.4. I would like to hear some discussions, on this from the people who presented growth data today.

ANSWER: (Professor J. Biely)

3a) In other words, Professor March, what you are suggesting is that we actually have less protein material on the basis on 6.25 than we would have on the basis of 5.4?

ANSWER: (Professor D.R. Clandinin)

3b) One thing that I could volunteer in this respect is, that we at the University of Alberta, we have done some studies on the gross protein value of rapeseed meal. We found that in the pre-press solvent and in the solvent meals there is some variation in the gross protein value of different samples. I think that if you did the same type of work on soybean meal you would also find some variation in the gross protein value of the different samples. On the average the rapeseed meal samples were equivalent to the average of the soybean samples studied. If you have a sample of rapeseed meal that has a low gross protein value, if you include in the diet the same number of gross protein units from that sample of rapeseed meal as compared to a sample that has a high gross protein value, including the same number of gross protein units, you will arrive at the same growth. This actually has been done at our institution and we have submitted a paper for publication in this area.

ANSWER: (Professor J.P. Bowland)

3c) The point that Mrs. March raises, of course, can be applied to almost all feed ingredients, that this is not a constant factor of 6.25. I think that perhaps the important thing is to consider essential amino acid composition of these diets. Perhaps we are overstressing protein. Personally I can see little advantage in going to different factors for protein but stick with the nitrogen and then recognize that the important feature, insofar as poultry and swine is concerned, are the essential amino acids in these diets.

4) QUESTION: Is it suggested here, that this is non-protein nitrogen, and that is why we have to use the factor 5.4, or does the factor 5.4 arise because of the amino acid composition of rapeseed meal?

COMMENT BY PROFESSOR BELL

I would also like to join in this conversation at this time, and make a comment about the digestibility coefficients we have seen. You may recall that some people had reported protein in rapeseed meal being digested over 90%. Others were reporting protein coefficients of the order of 63, 64, 65. This, if you like, brings in the question of availability of amino acids which is another factor, and I think the level of protein that is fed at the time that protein digestibilities are determined is also a big factor.

COMMENT BY PROFESSOR BELL (Cont'd.)

The higher the protein level, the higher the apparent digestibility of the protein will be. So, all I am saying is that if you are going to be really careful about the definition of what isonitrogenous means, I think we do need to concern ourselves with the essential amino acid make-up and the availability of the amino acids, and perhaps digestibility for the time being will be the best index of availability of amino acids.

5) QUESTION: I have two questions: Could the group make any comment as to whether this meal was derived from Brassica campestris or Brassica napus, or both, and whether they think that might have some relationship to how good the meal is as a feed?

My second question is, could you give me the key points in the process which you think need to be controlled in order to give you a good quality meal for feed?

ANSWER: (Professor D.R. Clandinin)

As far as Canada is concerned, about 80 percent of the rapeseed grown in Canada is of the Brassica campestris type, and about 20 percent Brassica napus. Now, this does not mean that if one were to obtain a meal from a specific plant that it would necessarily be in that proportion. I know of plants in Canada where they operate almost entirely on Brassica campestris seeds. Therefore, the type of meal that they would be producing would be of the Brassica campestris type. So there is some variability in the type of meal insofar as source of seed is concerned that you would find in meals produced in Canada. On the second broiler table that I showed you, there were two meals that produced thyroid to body weight ratios of, I think, it was 15mg per 100 grams bodyweight, that is a thyroid size of 15mg per hundred grams bodyweight. Both of those meals were of the napus type, whereas the meals that produced a lower thyroid to bodyweight ratio were of the campestris type.

As far as processing is concerned, the essential thing in Canada is, that produce three types of meals: pre-press solvent meal, solvent meal and expeller meal. Now, there has been quite extensive work done in Canada showing that meals of comparable quality can be produced by these three processes, but in order to produce a meal of high quality by the expeller process, it is necessary to leave about seven percent of oil in the meal. This is economically unsound as far as a processor is concerned.

ANSWER: (Professor D.R. Clandinin)(Cont'd.)

He is interested in getting a maximum yield of oil. As a consequence most of our processors have switched from the expeller process to the prepress-solvent or solvent process. In the solvent process, as you probably know, one of the first things done, is to clean the seed. Then the temperature of the seed is raised rapidly to about a 100°C to destroy the myrosinase. This is critical, not only from the point of view of producing a meal of good quality for poultry feeding and swine feeding and cattle feeding but also to produce an oil in which you have a low content of the thiocyanate compounds. Subsequent to that, i.e., after the meal is brought to this temperature, it is going to be prepressed in the expellers, and the oil content is reduced from the 45% or so down to about 15%. Then the material is flaked and passed through the solvent process, and it ends up by being ground to the consistency at which the meal is sold. After solvent extraction, the solvent is removed, and there is a toasting process. I think that it is generally believed that the toasting process, as indicated here today, tends to improve the palatability of the meal and probably decreases the isothiocyanate content of the meal.

6) QUESTION: Recent analytical work at the University of Guelph, on selenium in Canadian feedstuffs showed that rapeseed meal had the highest level of any natural feed ingredient. As you are aware, this is an important ingredient in feedstuffs, and we are not allowed to add selenium to feedstuff, and I wonder whether this material is really available, if it is available, it certainly would be a good thing to promote the sale of rapeseed meal. We can obtain selenium deficiencies in Ontario by using soybean meal and corn alone.

ANSWER: (Professor D.R. Clandinin)

I was aware of this. As a matter of fact, Dr. Robblee had done a few determinations, and I believe, that he found the level about 10 times as high as in soybean meal.

COMMENT BY DR. TOMKE, SWEDEN

I want to mention some experience with rapeseed fed to pigs. We have carried out experiments with Swedish rapeseed meal. In most cases, we used between 3 and 5 percent rapeseed meal. We got negative results on daily gains and feed conversion efficiency, to the extent of about 3 percent, that means we got about 15-20 grams

COMMENT BY DR. TOMKE, SWEDEN (Cont'd.)

less daily gains. As Dr. Bowland said here, it might be possible that the addition of 5 or 10 percent decreases the gains and feed efficiency a little bit, but I want to stress "a little bit". It is, of cource, part of the price of rapeseed meal as to whether it is economical to use it or not.

Another question I want to put to Dr. Bowland. You showed one slide on digestibility values. The values were very low, I think about 68 percent. Is it possible to get such low values with ordinary feedstuffs?

ANSWER: (Professor J.P. Bowland)

Dr. Tomke, perhaps that was a bad choice of experiment, I would agree. Those were ration digestibilities, of course, not individual ingredients, but the ration digestibilities in the growing period were something in the range of 66-67 percent. They were somewhat higher in the finishing period, which, in fact, with the change in diet should normally not have occurred. Typically we would have anticipated about 75 percent digestibility on a barley-type ration that was used in that experiment. I cannot explain why they were lower in that particular case, but we do get this variability in digestibility occasionally, and I do not think it is associated with methods. I think Dr. Bell has encountered this on occasion too. It may have something to do with the particular cereal grains which are used in a particular experiment. They vary much more widely than our rapeseed meal does.

7) QUESTION: I have listened with considerable interest to Mr. Wiechmann's address, and I am wondering whether you can tell me that your views have changed as far as the use of rapeseed meal is concerned?

ANSWER: (Dr. H. Wiechmann)

As a feed manufacturer I am convinced that rapeseed meal as an ingredient can be used at a higher percentage than is now the case in Germany. I have told you that it is not possible to put more into the rations because of the open declaration. I have learned many things here in Canada, and consequently, I feel that the rapeseed meal made in this country is better than the German product as an ingredient for feedstuff. I hope that by 1972 we shall be as far that we can say, we have the same legislation as you here in Canada. Then there will come a very strong demand for rapeseed meal, and particularly the quality you produce in Canada. You should be prepared, when this will happen. You should also be able to deliver your rapeseed meal in winter via the East Coast, which is as yet not possible.

8) QUESTION: It would be very interesting to hear from our French friends here something about the losses during the fermentation process.

ANSWER: (Dr. T. Staron)

There is no loss of protein. We have a loss in dry matter to the extent of 10%. They are carbohydrates of the galactosan type. We observed an interesting phenomenon in the course of the fermentation. The viscosity went down during the first 15 hours of fermentation, then the viscosity remained constant. The change in viscosity corresponds exactly to the extent of hydrolysis.

COMMENT BY PROFESSOR D.R. CLANDININ

There is one question that I thought might come up. Somebody might say, well, what is the value of rapeseed meal compared to soybean meal? I think that is what every feed manufacturer should be thinking of. Our feed manufacturers have certainly done some thinking along this line. At a meeting in Guelph in April, we have fed the information on the nutritive value of rapeseed meal as a feedstuff for poultry into a computer, and the computer told us essentially this: a feed manufacturer could afford to pay about 70% as much for rapeseed meal as he would pay for 44% soybean meal. In other words, if soybean meal sells for $100.00 per ton, then he should not be prepared to pay more than $70.00 per ton for rapeseed meal. Of course, if he could buy it cheaper than this, he is getting a good buy.

9) QUESTION: Would you have a figure as well for swine and ruminants to compare soybean meal with rapeseed meal?

ANSWER: (Professor D.R. Clandinin)

a) I do not think we have this figure, but I am just reasoning as a poultryman might reason. If the M.E. value of rapeseed meal is higher proportionally in relation to soy for pigs than it is for chicken, then I would think that for pigs you should be able to pay a little more than for chicken.

b) Professor J.P. Bowland

Well, this particular meeting at the University of Guelph that Dr. Clandinin is referring too, was just at that time that the information became available on the higher D.E. and M.E. values for swine and, in fact, these were put into the computer, and I know it raised the levels that were brought in quite markedly as compared to the levels that were being added by using the old data, which were basically poultry M.E. values. I could not tell you in exact figures, but I think that it was in the range of 75-80 percent of the value of soybean meal.

SESSION VI

ADVANCES IN RAPESEED RESEARCH

CHAIRMAN: Dr. B.B. Migicovsky,
Canada Department of Agriculture,
Ottawa, Ontario.

CO-CHAIRMAN: Professor J.M. Bell,
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