Report on the visit to Australia

Eva Crane

Bee Research Association

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OUR HONEY

Our honey is the subject which has claimed most of my attention during the past five years. I believe concentration on this is the most important matter in our industry. It is the one thing which can get us out of our present difficulties and enable us to establish ourselves on a sound basis for the future.

Dr. Crane's visit to Australia and her subsequent report has been a highlight of the whole period, and has given direction and purpose to our efforts, not only in Western Australia, but throughout the Commonwealth.

She considered that bee management in Australia was at or above present world standards, but that honey management needed urgent and drastic attention. She believed that the present difficulties in getting a satisfactory price for exported honey are linked with the way honey is treated here in Australia.

Dr. Crane suggested that the most important function of the Honey Board with regard to honey offered for export should be to improve quality. She believed that the quality of many of the different types of honey produced by the bees and extracted by many of the beekeepers was perfectly acceptable to overseas markets, but that various forms of deterioration can be induced in handling.

She recommended that the characteristics of Australian honeys be studied, and that changes induced in flavours during handling and processing be investigated.

These and other recommendations made by Dr. Crane to the Honey Research Advisory Committee received the unanimous support of the State Apiculturists at their meeting in Canberra in March 1968, and were accepted by the Honey Research Advisory Committee.

As a result I was asked by the Committee to contact British and German honey chemists to obtain information on the technical side of the trade, with a view to obtaining the quickest improvement in the acceptability of Australian honey overseas. I was able to report back to the Department of Primary Industry and the Honey Research Advisory Committee at the end of May, and, we now know precisely what our overseas customers require.

The requirements form a long list, but basically they amount to honey as produced by good apiarists, packed in the type of container specified by the customer.
Packers who have developed processing and blending techniques to dispose of all honey to mass markets when there was a shortage of honey, may find the requirements difficult, but they are not impossible.

Today, overseas buyers can be selective in their choice of honey. If Western Australia does not supply what they need, they will buy elsewhere. It is not wise to forget the old trading principle, "the customer is always right".

The Visit of Dr. Eva Crane

Dr. Crane submitted to the Honey Research Advisory Committee what is probably the most comprehensive report on the Australian honey industry ever compiled. This report is long and contains a certain amount of very technical as well as confidential material which is bound to appear in a really worthwhile document of this nature.

In view of the importance of this report, and the desirability of acquainting the industry with the gist of it, the Honey Research Advisory Committee has issued an abridged version. For the benefit of all beekeepers in Western Australia, this issue of Apiculture is devoted to the publication of Dr. Crane's report.
REPORT ON THE VISIT TO AUSTRALIA

by Dr. EVA CRANE

INTRODUCTION

The Honey Research Advisory Committee has studied a report by Dr. Eva Crane, Director of the Bee Research Association, following her six-weeks visit to Australia in October-November, 1967. During this period Dr. Crane visited all States and the Australian Capital Territory and had discussion with officers of State Departments of Agriculture and with interested personnel in CSIRO and Universities. She addressed many meetings of Beekeepers' Associations and visited a considerable number of individual beekeepers.

The purposes of Dr. Crane's visit, which was made at the invitation of the Honey Research Advisory Committee and financed by joint Commonwealth/Industry research funds, were:

(a) to study Australia's need in bringing the results of research in apiculture throughout the world to practical honey producers;

(b) to lecture on the activities of the Bee Research Association and on how the B.R.A. can help the beekeeping industry;

(c) to advise State Department of Agriculture apicultural extension officers on the facilities provided by the B.R.A. and on how to make best use of those facilities to assist in the development of the beekeeping industry;

(d) to advise on how the activities of the B.R.A. can be developed and extended in Australia;

(e) to list aspects of Australian methods and research which she felt were most important.

Due to the comprehensive nature of the report, its length and the inclusion of technical and other matters not yet fully considered, it has been decided to issue, for general information, the following abridged version, consisting of extracts of interesting comments and recommendations made by Dr. Crane, omitting some of the detailed reasoning on which her conclusions are based.

These extracts deal mainly with (a) and (e) above; the full report also explains how information on research work can be obtained through the B.R.A., (c) and (d) above.
Details about this are now available within Australia from the following B.R.A. Regional Representatives:—

Mr. R. B. Gulliford,
No. 2 The Boulevards, Kooringal, Wagga Wagga, N.S.W.

Mr. D. F. Langridge,
P.O. Box 28, Croydon, Victoria, 3130.

Dr. F. G. Smith,
Department of Agriculture, Jarrah Road, South Perth, W.A., 6151.

Mr. D. G. Cunningham,
Department of Agriculture, P.O. Box 163, Devonport, Tasmania.

THE AUSTRALIAN HONEY INDUSTRY

In centuries gone by, basic scientific knowledge was too scanty for the management of bees and honey to be anything but empirical. The position is very different today, and no country can be successful in world trade unless it is as up-to-date as its competitors in relevant fundamental scientific knowledge, and in the technical applications of this knowledge. If all the honey that can be produced in Australia could be consumed within the country, much of
what I have to say would be unnecessary. I am writing on the assumption that Australia wishes to maintain or increase honey exports, at a satisfactory price, that is, a higher price than the present one.

Australia has certain advantages over some other honey-exporting countries:

1. The potential honey yield per hive is very high, possibly the highest in the world.
2. A high proportion of the honey remains liquid for a long period.
3. Much of the honey has a high solids (low water) content.
4. There is a long active season for honey-getting, brood rearing, and queen raising.
5. There is no long winter period with temperatures that prevent bee flight.
6. The incidence of insecticide poisoning of bees is low, since most of the honey comes from trees and wild plants that are not sprayed.

The Australian honey industry is, however, handicapped:

1. It is geographically isolated; this increases export freights for honey and limits scientific and technical contacts with other countries.
2. The separate administration of the Australian States makes effective collaboration between them difficult.
3. There seems to be a special psychological difficulty in getting individual Australians to unite in tackling a problem on a national basis.
4. Honey production is not a big enough industry to support much research on its own.

In comparison with world standards, Australian bee management is in general good. Honey management lags behind, however, in that far too little use is made of recent scientific and technical knowledge. I am surprised that so little research has been done on the composition of honey specific to Australia, which can only be studied there.

In general what seems lacking in the Australian bee/honey industry is wise advice from people who are correctly and adequately informed about all aspects of whatever problem is being dealt with.
BEE BIOLOGY

The bees in Australia are of the same genetic stock as those that have been studied intensively in many European and American scientific departments and institutions. All such fundamental research work on honey-bees, their pathology, honey-getting capacity and other characteristics, is applicable in Australia, wherever the research has been done. I would suggest that in view of the shortage of research workers and the urgent problems on hand, high priority should not be given to this type of research in Australia. Much use can be made of the work done elsewhere, but this necessitates current awareness of research in other countries.

BEE MANAGEMENT

In many ways, especially mechanical handling of hives and their transportation, some beekeepers in Australia are, I think, in advance of the rest of the world.

Feeding bees is a necessity in many countries, but most Australian beekeepers can get enough honey to eliminate problems associated with sugar or syrup feeding. If this ever becomes a necessity, it should be remembered that much research work has been done, and results are available. On the other hand, shortage of pollen can be as
severe in some parts of Australia as anywhere in the world; although the problem occurs in many countries, it takes a special form in Australia, in that a rich honey flow can co-exist with pollen dearth.

**Queen rearing** is an important part of Australian bee-keeping; because of the long egg-laying season, a beekeeper needs many new queens each year. I saw some very good queen-rearing establishments in Australia, and some that are not so good. Most operators had worked out or inherited a system that suited them, but not many seemed to question their own methods, or to look for improvements. Yet queens are reared in 90 or more countries, and much research work has been done which is valid in Australia. As in other branches of the bee/honey industry, until people realise how much useful knowledge is available, they inevitably remain ignorant of the specific knowledge that can help them.

**Bee breeding** must not be confused with queen rearing. It is likely that bees exist, or could be bred, which are more suited to conditions in some parts of the Australian continent than the bees now used. But conditions vary so much that solving the problem for one area would not solve it for all, and in view of the general lack of success of bee breeding programmes, it does not seem a very profitable line to pursue.

Problems in Australia (heat, drought, pollen dearth, etc.) are different in degree, but not in principle, from those in other countries. The greatest possible use should therefore be made of research work done elsewhere.

**HONEY MANAGEMENT**

I have said that in bee management the Australian standards I saw seemed to be at or above present world standards. This is not so with honey management. Some I saw were satisfactory, but some were out of keeping with current knowledge and developments elsewhere, and violated the known requirements of honey. I was surprised at the lack of hygiene in some places.

I believe (a) that honey management needs urgent and drastic attention, and (b) that the present difficulties in getting a satisfactory price for exported honey are linked with the way honey is treated. Many aspects of Australian honey management seem to be out of date, with disregard for recent research into the properties and composition of honey, and methods for characterizing and assessing it. This may not matter for honey sold within Australia where there is no competing honey. But if it is to be exported, for use by firms up to date in their knowledge of honey research
(and even ahead, through their own unpublished investigations), then improved and more precise quality control must be established, or Australian honey will continue to fetch minimal prices.

In view of this, I suggest that the most important function of the Honey Board with regard to honey offered for export should be to improve quality. The authority for establishing the Honey Board mentions the word honey 15 times, but bees, beekeeping, beekeepers not at all. Yet the Advisory Committee seems to act as a Beekeeping rather than a Honey Committee. In view of the urgent need for improvement of honey quality, I suggest (a) that the Committee should direct more attention to honey research, and (b) that someone should be appointed to it who is familiar with honey technology.

The most urgent research need seems to be for a food chemist to be put on to honey studies.

The only characteristics of honey I heard mentioned by honey packers in Australia were water content (which determines solids content), colour and flavour. Flavour was
judged by an Australian palate, yet preferred honey flavours vary greatly from country to country, and are determined largely by custom and usage in each country. The Australian palate is very different from that in the U.K., Germany, or Japan, which themselves differ widely. The blending properties of different honeys are also important here.

Unless honey quality is improved, importers in other countries may have to correct its faults by processing which leads to an end-product little different from other invert sugars. It is uneconomic for European firms to import the raw material for such a product from a country as distant as Australia, and they will not do so except at a minimal price. This may give the Australian beekeeper such a low return on his capital investment, running expenses and labour, that he is forced out of business.

Australia's competitors for the world honey trade are at different stages of development in their honey management; Canada is probably the most sophisticated (but produces almost no honey that will remain liquid), and China the least. From information the B.R.A. has on record, or has published, and from sources not yet publicly available, I believe that China has a great potential as a honey-producing country, and that its exploitation has only just begun. If the Chinese government has not already got expert advice on bees and honey management, it will almost certainly do so soon. The Chinese people are unaccustomed to eating honey, and most of the harvest would be exported. Chinese honey is therefore likely to become increasingly important on the world market.

I am personally concerned that the Australian beekeepers should get an adequate return for their labour and investment, and if they are to do this they need competent advice as to what is required from them that will satisfy the honey buyer's requirements.

The State expenditures seem to be largely on bee management (disease inspection, etc.), and Department of Agriculture extension officers are trained in agriculture and stock rearing, not in chemistry. They must learn what to pass on to beekeepers, but from whom?

I believe (although I have no evidence other than my own observations) that the quality of many honeys produced by the bees in Australia is good enough. But various forms of deterioration can be induced in handling, and improvement of quality is most likely to be accomplished by a drastic overhaul of methods used for extracting, storing and handling the honey from the moment it leaves the hive, and by suitable choice of combs for honey storage.
Some possible causes of reduction in quality are listed below.

(1) Bee management
   (a) use of brood combs for honey.
   (b) contamination from repellents during removal from the hive.
   (c) removal of unripe honey for extracting.

(2) Uncapping
   (a) honey heated and in contact with molten wax in cappings melter.
   (b) high proportion of honey with the cappings, and then mixed back with uncontaminated honey.

(3) Extracting
   (a) excessive local heating at bottom of extractor.
   (b) contamination with metals from scratched or damaged extractor or fittings.

(4) Moving
   (a) excessive heating to liquefy the honey so that it will run through pipes.
   (b) contamination with metals, as 3 (b).

(5) Storing
   (a) excessive local heating near the surface of drums stored out of doors at high temperatures.
   (b) contact with beeswax particles melted locally at hot points of drums.
   (c) overlong and/or excessive heating in hot-room before filtering.
   (d) contamination with metals during (a) and (c).

(6) Straining
   I saw no straining procedures that would cause damage to honey, such as pressure-filtering through diatomaceous earth.

(7) Blending
   Honeys which might be judged of good quality by importers can be spoiled by blending, if this is done empirically to suit an Australian palate, or by colour.

I was rather surprised not to see any continuous-flow processing in Australia; I suggest that this should be explored, in view of the losses normally incurred in batch processing.
COMPOSITION AND PROPERTIES OF HONEY

Whereas the genetic stock of bees in Australia is the same as elsewhere, many nectar sources in Australia occur nowhere else. Honeys from these nectars have specific characteristics which can only be studied satisfactorily in Australia. I find it strange that so little has been done in this respect, and that the honeys should still be offered on the world market on an empirical basis. They have to compete with honeys which have been systematically studied and which can be characterised in the same language as that used by the packers in importing countries.

I would recommend that a study of Australian honeys should be instituted, this study to be planned in the light of current scientific knowledge and awareness of what factors raise or lower the value of honeys on the world market. It may well be that some Australian honeys have special characteristics which affect their value and that of their blends; these are facts that need to be known and can only be got in Australia. Certain characteristics may be very relevant to the problem of spoilage during extraction and processing.
An objective study is also needed on honey flavours and their changes during handling and processing, and the possible use of vapour partition (or other) chromatography should be explored. To give an example: For as long as I can remember, Australian honey has been linked in the English consumer's mind with a "musky" flavour which is commonly thought of as "eucalyptus", and is disliked by many in the U.K. I do not know the origin of this flavour, as it was not present in any samples I took from the combs in the hive.

These remarks are especially relevant to Western Australia, because the honey industry there cannot survive without a satisfactory export trade, and this export must be to countries outside Australia since the rest of Australia already produces more honey than it consumes.

**BEE BOTANY**

Bee botany is basic to honey management, because differences in the characteristics of honey originate almost entirely in their botanical origin.

The problems can be studied only in Australia; since they are botanical I think that valuable help could be got from co-ordination with botanists and agronomists in Australian universities and other scientific departments.

I would stress, however, that general honey management in Australia, irrespective of the peculiarities of certain honeys, can be improved greatly without doing any botanical research, or indeed without waiting to acquire new information about specific Australian honeys, by applying knowledge already available.

**GENERAL**

In Australia there is a wealth of honey to be got; I believe, although I cannot state categorically, that much is of good quality on a world standard, as the bees produce it.

In Australia in general I found a great lack of awareness of current (or even past) research that could help the industry. A few individuals are very well informed and among these are some of the extension officers.

The Committee (and the Board) should keep an open mind as to which honeys should be exported and which used within Australia. It may well be that honeys should be selected as suited for the export market, and the rest sold in Australia. If the leftovers are exported the price is likely to remain low. It may well be also that some honeys should be deliberately kept off the general market and used for stock-feed or some industrial purpose. I hope that the use of honey for the commercial production of mead, which
has just started in S.A. and W.A., can be extended, and the honey chemist could probably help with technical advice. Knowledge of the characteristics of honeys from different plants would show which should be used for which purposes, and enable those suitable to be sold as high-quality table honeys, under attractive but representative names. I think it is no longer useful to try to get honey sold in other countries under the umbrella name "Australian honey".

I do not want to conclude this report without acknowledging the great help and kindness I received whilst in Australia. The Honey Board’s invitation has enabled me to widen my own experience in a most valuable way. This is also of special value to the B.R.A. and thus to world bee technology and research, because it seems that no one from Europe has previously made a study of Australian conditions, and the scientists from the U.S. have been concerned with specific aspects or regions, not with the problem of the industry as a whole.

The rest of the world will gain by learning more of advances made in Australia, and I hope that specialists in some fields will, as a result of learning of problems peculiar to Australia, become interested in helping to solve them.