

The Devil in the Milk

A1 or A2? How Beta-Caseins Are Changing the Dairy Industry



There's a devil in the milk, says agricultural scientist Keith Woodford, and it has little to do with production methods. Woodford's startling thesis, backed up by a pile of research, is that a mutation many years ago created an aberrant protein in some European cows, called A1 cows to set them aside from all other cows, which are called A2. As a result, the milk from these cows has been linked to a host of maladies, including Type 1 diabetes, autism and heart disease.

Still virtually unknown in this country, the A1-A2 question is prominent enough in New Zealand, where Woodford lives and works, to have spurred public controversy and the creation of a successful company that markets only A2 milk, the a2 Corporation. For growing numbers of Americans who have noticed that milk seems to attack their systems even though they are lactose-tolerant, Woodford's work, collected in his book, Devil in the Milk, offers vital illumination.

Keith Woodford

ACRES U.S.A. What brought you into contact with the story of A1 and A2 milk?

WOODFORD. I'm a professor of agribusiness, and I also have a science background — that's what I was originally trained in, agricultural science. I'm always out there scanning to see what the issues are, and I've been aware that there was this issue of A1 versus A2 milk for quite a few years. To our mainstream dairy industry it was a non-issue, just a marketing game some people were playing, and initially I took that view. Then I saw that a colleague of mine had become a director of the a2 Corporation, and I thought the quickest way for me to find out what's going on here is to ask him a very direct question, which was, "Why have you gotten involved with a shonky outfit like the a2 Corporation?" Of course that immediately got a response, and he pulled some material up from his bag and said I'd better read it before I made statements like that, and that's exactly what I did. Then I went on the Internet and downloaded scientific articles from the various journals, and 48 hours later I thought, "Wow, this is a really big issue!"

I was unhappy with the way the whole subject was being manipulated by the mainstream industry, and it seemed to me a story that had to be told. That in itself was quite a challenge because I'm working with the mainstream dairy industry and other agribusiness industries all the time. I'm in the media very regularly on a whole range of agribusiness issues, and this one certainly raised the heat somewhat.

ACRES U.S.A. You're featured as an expert in the media in Australia and New Zealand?

WOODFORD. Particularly in New Zealand. I'm on the radio I guess every week here — on national radio they're always ringing me in relation to agribusiness matters. In Australia I've done the odd television program, and probably quite a few radio interviews, too, if I think back over the years. My profile would be a lot higher in New Zealand than in Australia, though.

ACRES U.S.A. For people who don't know, New Zealand is a heavily agricultural country?

WOODFORD. Absolutely. We're a little country down in the South Pacific, 4 million people, and our economy is based around pastoral agriculture, with the dairy industry being the most important.

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ACRES U.S.A. Another thing that's not widely known in the Americas is the whole issue of A1 versus A2. Up here the issue is organic versus conventional — how milk is produced and how it's processed. What is the history of A1 and A2 down there in the Antipodes?

WOODFORD. It's exactly right that it started here, down under. This issue hasn't found major traction yet in the United States or in Europe, and the mainstream industry of course would like it to stay that way for as long as possible. It really started with a professor of children's medicine at Auckland University, Bob Elliott. He was looking at diabetes, childhood, Type 1 diabetes, which is the one where you actually have to have insulin. Once you get it you have it right through your life, and you have to take regular insulin shots. Professor Elliott was puzzled by the fact that some Samoan children living in New Zealand had much higher incidence of Type 1 diabetes than Samoan children living in Samoa. He said, “This has to be an environmental effect, not a genetic effect, because they're the same people, the same ethnicity.” He looked to see what differences there were in the environment or in the foods they ate, and the key difference was milk. Children in New Zealand, be they Samoan or any children, drink a lot of milk. Whereas in Samoa itself, in the islands, they tend not to. He also knew already that casein was what we call diabetogenic — it was linked to diabetes. So he rang the New Zealand Dairy Research Institute here, arguably the leading dairy research institute in the world, and said,

“I don't understand what's going on. I think there has to be a link to milk, but I also know that there are some parts of the world, such as in Kenya, where some groups of people drink huge amounts of milk but don't get any Type 1 diabetes.

Is there anything slightly different about the milk they drink from what we drink here in New Zealand and places like the United States?” The dairy scientists said there *is* a difference, there's a small difference in relation to the casein — it's only a tiny difference, but it could be the answer. In places like Kenya the milk is what we call A2, and in places like New Zealand and the United States the cows are about a 50-50 mix depending on whether they produce A1 beta-casein or the A2 beta-casein.

ACRES U.S.A. What is a casein, and what are A1 and A2?

“There are different types of casein proteins, and within one is a particular type called the beta-casein, where there are these two variations, A1 and A2.”

WOODFORD. Milk of course contains some protein, some fat, some carbohydrates in the form of lactose, some minerals and some water. What we're talking about is the protein component. The protein itself consists of two types, the casein and the whey. You know the children's rhyme about Little Miss Muffet and her tuffet, eating her curds and whey. The curds are the casein, and the whey is the other form of protein. There are different types of casein proteins, and within one is a particular type called the beta-casein, where there are these two

variations, A1 and A2. It all gets quite complicated, but we all know that milk is a very complex product. We're just saying that with one of the proteins within milk there's a very slight difference.

ACRES U.S.A. Milk is not milk as it was a hundred years ago — they take it apart and boil it until it is sort of a milk-like product. Do A1 and A2 survive all the processing?

WOODFORD. The answer is basically yes. There is debate as to whether the pasteurization process might denature the protein in some way, and there's some debate over whether pasteurization makes the problems with A1 milk even greater, but the science on that isn't totally certain yet. The bottom line is that once people drink the milk, the A1 beta-casein digests differently than the A2, and with the A1 there is release of what we call a peptide, which is a little fragment of protein called beta-casomorphin-7. That's a terribly long word, and that's why I sometimes call it the “milk devil” or BCM7 or the casomorphin, *caso* meaning casein and *morphin* meaning morphine. This is an opioid — it has morphine-like characteristics, and if it gets through from the stomach into the blood then it can cause all sorts

of problems. The body doesn't like it and tries to react against it, and depending on the particular genetic makeup of the person, we can get all sorts of illnesses.

ACRES U.S.A. Does it cross the blood-brain barrier?

WOODFORD. It crosses the blood-brain barrier very clearly. Interestingly, until recently there were no good tests for beta-casomorphin-7 in the blood, but some Russian scientists just in the last few months have come up with blood

tests for BCM7, and this work actually just came out in the *International Journal of Peptide Research and Therapeutics*. They've not only been able to find the BCM7 in the blood of little children that are fed formula, but they've also found that some of the children excrete the milk devil, the BCM7, quite quickly while others don't. The children who don't excrete it quickly tended to exhibit delayed development. This research is so new it's not in my book, and I think it's going to be a debate changer. It's going to be very hard to ignore this evidence.

"We know in general that when mice and rats are fed A1 beta-casein, they get much higher levels of diabetes than if they're fed A2 beta-casein."

A lot of other scientific groups are going to be able to use the tests the Russians have developed, and it's going to take the whole field of research to another level.

ACRES U.S.A. By delayed development, do you mean their growth as children making bigger bones and so on?

WOODFORD. No, it's not their physical size, it relates to what we call their psychomotor development. It's the neurological development and their physical development in terms of muscle capacity — it's not actually physical size as such. People don't grow any slower, they just don't develop their human characteristics at the same rate.

ACRES U.S.A. Obviously any interference with psychomotor development could have unfortunate effects?

WOODFORD. Absolutely! The dairy industry both here and in Australia is already scrambling to deal with this particular evidence.

ACRES U.S.A. What usually happens in the United States when something threatens the image of an extremely profitable food product is that it becomes hard to research, because the agribusiness corporations fund a lot of university research and wield great influence. If

they don't want an issue investigated, it gets harder to get the research funded. How has the evidentiary trail developed in New Zealand and Australia?

WOODFORD. In the United States there was in fact a lot of very interesting work undertaken at the University of Florida studying whether BCM7 is implicated in some of the symptoms of autism. It was led by Professor Robert Cade, who is now dead, but he's very well known, particularly in Florida. Among many other things he invented a drink called

Gatorade, but he also did a huge amount of work on diseases such as autism, and I'm reliably told that his work was essentially shut down because of pressure from large agribusinesses in the United States. His work related to both gluten, which is somatically quite similar to the BCM7 as well as to milk and casein, and the agribusiness industries over there were very, very negative. Here in New Zealand our mainstream industry initially was involved in research, but once they realized the threat that the research posed, they went to great lengths to muddy the water. They've even been associated with research trials, one of which was published in the international journal *Diabetologia*. Supposedly groups of rodents in three different countries — Canada, Britain and New Zealand — were fed either A1 or A2 milk with all of their diets supplied from New Zealand by the Dairy Research Institute. What happened, presumably by accident, was that the A2 diets were contaminated with exactly the chemical, a little peptide, that was believed to be causing the problem. So here we had two groups of animals supposedly fed A1 and A2, but the A2 diet had actually been contaminated with the bad product from the A1 — and at a high level. As a result, they didn't get very strong evidence that there was a great difference between A1 and A2. The amazing thing is that the results of that

trial were published, but no mention was made of the contamination.

ACRES U.S.A. Did this sloppy work cause a scientific scandal?

WOODFORD. It is a scandal, but in this case the industry has gotten away with it. In my book I published the evidence and name the names. It's something I couldn't do if I didn't have the evidence, because of course I would have been sued immediately. The evidence is all there. The scientists knew about the contamination at least 18 months before the paper was published, but they made no mention of it, and in fact that particular trial is the one the mainstream dairy industry uses again and again to argue against the A1-A2 issue. So yes, I think it is a scientific scandal. It's out there in my book but it's not in the international headlines.

ACRES U.S.A. What kind of evidence links A1 milk to diabetes and autism, and how compelling is it?

WOODFORD. There is a debate as to how compelling it is. I think that if one looks at the evidence quietly and objectively, overall it is overwhelming. If we look at the Type 1 diabetes to start with, wherever in the world the level of A1 beta-casein is high, then we have high levels of Type 1 diabetes. The United States fits into that category, as does Canada. In rural countries where A1 beta-casein is low then Type 1 diabetes is also low. That's a good starting point, but of course there could be other factors that lead to that, so then we guess again under the science. We're talking about Type 1 diabetes and we know in general apart from this contaminated trial that I told you about, that when mice and rats are fed A1 beta-casein, they get much higher levels of diabetes than if they're fed A2 beta-casein. We think we even understand the mechanism. In Type 1 diabetes what happens is that you get destruction of the islet cells within the pancreas, where insulin is manufactured. We can actually find a sequence in the islet cells, a sequence of amino acids that is very similar to the beta-casomorphin 7. Now, we know that Type 1 diabetes is an autoimmune disease, and that means the body is accidentally

attacking itself, it's what I call the medical analogy of friendly fire. The body is trying to attack something, presumably the BCM7, but it's getting confused and it's actually attacking something in itself which looks a bit like the enemy. Now, there's no doubt that Type 1 diabetes is an autoimmune disease, so this story fits really well.

ACRES U.S.A. Autism is a big issue in the United States. It's going up, up, up, nobody knows why, and parents are wild with worry. What links A1 to autism?

WOODFORD. Autism is obviously a very complex disease, and nobody has really claimed that the A1 beta-casein *causes* autism. What they're saying is that in autistic children, A1 beta-casein makes the disease much worse. There are a number of groups that are working on this. What appears to happen is that autistic children also happen to have digestive issues, and they often have what we call a leaky gut. The leaky gut allows the peptides — the milk devil, the BCM7 — to get through from the gut into the bloodstream, where it does all sorts of things, and it does go straight through the blood-brain barrier. It's very hard to do clinical trials where you take a whole lot of children and give some of them this horrible thing called BCM7, do all sorts of tests on them to measure what's happening, and give the other group the A2 protein. We have to work with animals, and what we find with animals is that the BCM7 does indeed cause all sorts of weird psychological problems. What happens then, of course, is that skeptics say, "Yes, but that's animals, that's not humans." They've got all sorts of arguments to muddy the waters. All we know is that there's a lot of autistic children who, if you can get them off casein and if you can get them off gluten — what's called the gluten-free, casein-free diet — then their symptoms are a whole lot better. Now we have this new test for measuring the BCM7 in the blood that should lead to some pretty quick advances as to the extent of which the A1 beta-casein is implicated in autism.

ACRES U.S.A. What about children who have no glutens in their diet but go on

drinking A2 milk? Do you see the same kind of positive results?

WOODFORD. You certainly do in some. I have to be careful about the specific instances, but I have examples here in New Zealand of autistic children who can drink A2 milk but behaviorally go just totally stupid on ordinary milk. There have been quite a lot of studies, particularly in Scandinavia, where they have looked at children who are given the casein-free diet versus those who stay on it, but the problem is that those trials don't actually meet the full double-blind standard.

ACRES U.S.A. Let's play devil's advocate here. Suppose someone argued that this is all well and good, but there's a strong argument to be made that raw milk is more healthful in a whole lot of ways than pasteurized, processed milk and that perhaps you're overemphasizing this protein difference?

WOODFORD. Well, even if it's raw milk, if it comes from cows that are producing A1 beta-casein then we've got a problem. So it may be possible to say that pasteurization makes the problem worse in some situations, but there's no doubt

that we now have the A1. In any herd there will be a mix of A1 cows and A2 cows, so it is possible to breed for A2. Here in New Zealand the commercial tests are readily available — you DNA test your cows. In the United States, it's a huge frustration to me because at this point those tests are not available. I think it's also important that people understand that all other mammalian species are essentially A2.

ACRES U.S.A. Mother's milk, goat milk?

WOODFORD. Yes, goat milk is A2, so is sheep milk and so is human milk. Human milk is essentially of the A2 type. Even within cattle, African cattle and Asian cattle are all A2, it's just a proportion of European cattle that are A1. Here in New Zealand a lot of our farmers are converting their herds to A2. The mainstream industry is saying it's not an issue, but we've got enough publicity out there that a large number of farmers only use semen from A2 bulls. All the bulls we use in the national breeding scheme are categorized as to their A1 and A2 status, whereas in your part of the world that isn't the case. Although we're only a little country, we dominate international

“It's also important that people understand that all other mammalian species are essentially A2.”

that BCM7 is still going to be released from raw milk if it comes from cows that produce A1 beta-casein. We know the bio-chemistry clearly enough as to how the A1 beta-casein breaks down that it will not be benign in raw milk. We can say that unequivocally. The A2 milk that I drink, incidentally, is organic. But it is also pasteurized.

ACRES U.S.A. OK.

WOODFORD. I wanted to make the point, I think it's important for your readers to appreciate that the A2 cow is the natural, original cow — that originally *all* milk was A2 — and it's only because of the mutation which has affected a proportion of modern cows

trade in dairy products, and we are quietly converting our herds — not quite as fast as I would like, but we are converting them across to A2. Thus, the world's going to wake up eventually.

ACRES U.S.A. It's happening without government, without incentive or pressure, it's just happening because the consensus is shifting that way in New Zealand?

WOODFORD. It's happening because a lot of dairy farmers are saying, "Hey, we can actually convert our herds at minimal costs. It won't cost us a lot if we had to suddenly be 100 percent A2 tomorrow, we couldn't do that, but if we only use bulls that are A2, we can actually get

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our herds across to being pure A2 within about 10 years.” So they just say, “Hey, let’s do it!”

ACRES U.S.A. Why not!

WOODFORD. And a large number of farmers are in fact doing it.

ACRES U.S.A. Is there a connection to other psychotropic maladies, such as bipolar illness or chronic depression or schizophrenia?

WOODFORD. We don’t have clear evidence of that. It’s amazing as time goes by that this BCM7 seems to be associ-

actually autoimmune diseases. They’re all basically friendly fire diseases, and that includes Type 1 diabetes, the body turning on itself. We now understand that heart disease is also essentially an autoimmune disease caused by inflammation in the arteries.

ACRES U.S.A. If you consume dairy products regularly, you’re getting a relevant quantity of it over time?

WOODFORD. That’s right. A key issue is that it’s going to affect some people a lot differently than it will others. The key issue is whether or not you have a leaky gut or leaky intestines. There are

“We also know from trials that if you feed one group of rabbits A1 and the other A2, then those fed the A1 will get arterial plaque whereas the A2 rabbits don’t.”

ated with more and more diseases, but because we don’t have what I regard as proof for those diseases, I’m not going to make any claims. The one I would like to mention is that there’s very clear evidence that BCM7 is associated with heart disease. Once again, the countries that have high levels of heart disease are the countries that have high levels of A1 beta-casein intake. We also know from trials that if you feed one group of rabbits A1 and the other A2, then those fed the A1 will get arterial plaque whereas the A2 rabbits don’t. There’s pretty strong evidence there.

ACRES U.S.A. This is a really nasty little protein.

WOODFORD. It *is* a really nasty little protein! The biochemistry is pretty clear. We know it’s a strong opioid. When we go for a run we produce our own endorphins, which are weak morphine-like substances, but what’s good in small doses *isn’t* necessarily good in big doses. It seems unbelievable that one little protein could be implicated in so many diseases, but it all makes sense when we understand that all of the diseases are

a whole range of conditions whereby people do have leaky guts and by this we simply mean that a digestive system where peptides can get through into the bloodstream without being fully broken down. Some of those conditions include stomach ulcers, celiac disease, Crohn’s disease, ulcerative colitis. If people have been on antibiotics there’s a fair chance that they will have a leaky gut for some weeks thereafter, and of course little babies all have leaky guts, that’s the only way the colostrum can get through. The key issue is that in some people it’s going to get through the leaky intestine much more efficiently than in others. We’re also now finding that some people have the genetic capacity to excrete the BCM7 quickly, excrete it through their kidneys, quite possibly broken down in the liver and out through the urine, whereas others don’t.

ACRES U.S.A. Even if the citizens of North America and Europe are not aware of the issue, the large food companies must have taken note of this, and it must be terrifying for them. The potential health claims could run in the billions.

WOODFORD. They have huge files on this, yes, and to date they have been quite effective in keeping a lid on the issue. What I say is, look, the evidence is all out there in the international journals, and in my book what I set out to do was to bring all that evidence together and actually present it to people so they could make their own conclusions. In the book I try not to hammer my own views, rather I just try to present all of the evidence as succinctly as possible, including the counter-arguments made by the mainstream dairy industry. I happen to believe that those arguments are based on self-interest and fudging the issues, but I try and present it all so people can make their own decisions.

ACRES U.S.A. We could expect that the food industry will try to delay this issue as long as possible?

WOODFORD. Absolutely.

ACRES U.S.A. How long has the a2 Corporation of New Zealand been in operation, and how has it fared?

WOODFORD. That company was formed about 2000, and the aim was to commercialize A2 milk all around the world. They have had the greatest success in Australia. If you go into an Australian supermarket you will find A2 milk there with its special labels. You’ll find it in absolutely every supermarket. It’s still a niche product and it sells for about double the standard milk in those supermarkets. It’s very expensive but is a commercially successful product, sales are growing every month. In New Zealand they haven’t managed to market the product quite as successfully, but I buy it from my supermarket. It’s the only milk that I will drink, and it is available here if you’re looking for it. In the United States they have a joint venture there with a company to sell through the Hy-Vee supermarkets in six or seven Midwestern states, but the marketing issues are quite complex. How do you get the message out? You see, in food marketing you have to be very careful not to denigrate another company’s product, and you’re very constrained in what sort of claims you can make on the label. There’s a lot of scientific evidence,

more than 100 scientific papers, but it's very difficult to actually communicate this message, particularly when you've got a mainstream industry that will come down on you like a ton of bricks as soon as you make any negative comment about the ordinary A1 milk.

ACRES U.S.A. The information has to circulate on the margins of the mainstream discourse, and as people believe in the evidence, the market demand will materialize over time. All you have to do is put it on the label without making any claims. That's how it seems to work in the USA.

WOODFORD. Yes, well, their marketing works in Australia. They don't make any explicit claims on the label, but word of mouth is amazing, so what we've got is a whole lot of people who can't drink the ordinary A1 milk but can drink the A2 milk. Most of these people thought it was because they had a lactose intolerance. What we're finding is that the majority of people who think they have a lactose intolerance don't have such a thing at all — what they have is an intolerance to this A1 beta-casein. They can drink the A2 milk despite the fact that it's got lactose in it. The way the message travels in the modern world, sales just keep going up each month without any claims being made on the label. Of course I can, as a university professor, discuss the science and occasionally get on television or radio talking about it, and that certainly doesn't do them any harm, but the companies themselves have to be very careful in terms of what they actually say in their advertising. Certainly I make it clear that I have no commercial relationship with the A2 companies. I stay totally independent. I undertake no paid consultancies in relation to A2. Anything I do in this regard, I don't charge for, and I hold no shares in any of the A2 companies. I do undertake consultancies with a range of agribusiness companies. I don't hide any

of them, but I don't do any in relation to A2 milk because that would create a perceived conflict of interest.

ACRES U.S.A. Aside from the marketing through Hy-Vee, do you know of any American dairy companies that plan to market A2 milk?

WOODFORD. At the moment, no. The issue is complicated because the a2 Corporation has patents and trademarks, and this actually makes it difficult for other companies to get involved. The a2 Corporation has themselves tried to market within the United States, but to date hasn't been particularly successful.

ACRES U.S.A. Perhaps a partnership with an American company would be in order?

WOODFORD. Absolutely. The challenge for everybody is that all the existing milk companies say, "Hey, how do we actually promote A2 milk but still manage to sell our A1 milk during the transition process, which will go on for quite a few years before we can get all the herds across to A2?" So they prefer to just hope that the issue would go away. If we look back, say, 10 years ago, there was a chance that the issue *could* just go away, but as the new research keeps coming through, and in my book I refer to more than a hundred peer-reviewed scientific papers that build the evidentiary pathway, it's just getting stronger and stronger. To me there's no doubt what the final outcome will be. The big question is whether we're going to reach that point of the final outcome where we all move to A2 milk within the next five years, or is the battle going to go on for another 20 or 30 years? At the moment the anti forces are politically very strong. It is happening, but at the moment it's happening faster on this side of the world than on your side of the world.

ACRES U.S.A. What can we expect when the issue breaks open in this hemisphere?

WOODFORD. Some people in the mainstream dairy industry will say things to me like, "I think you're right, but we must not do anything that would damage the dairy industry, after all it is our most important industry here in New Zealand." My response is, "Oh you sound just like the tobacco industry!" People are shocked when I say that, but it's actually the same fundamental lack of understanding that is leading to that perspective: "We must not do anything that damages commerce."

Keith Woodford's book, *Devil In The Milk: Illness, Health and the Politics of A1 and A2 Milk*, is available from Acres U.S.A. See page 70 of this issue for shipping information or visit www.acresusa.com.



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