

Bayer AG Capital Markets Day

Crop Science Sessions

5 December 2018

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Introduction to Agriculture

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All right. Good afternoon everyone. Welcome to our first session of this afternoon. We are very excited that you spend the afternoon with us to do some deep dives into the Ag business of Bayer. My name is Frank Terhorst. I am leading Strategy and Portfolio Management at our new Crop Science Division.

We are excited that we can spend some time with you here to go a little bit deeper into what Liam has already shown us this morning, and in this very first session here we would like to cover some of the foundational and basic dynamics in the Ag industry.

It's intended here to give you a little bit of an overview about the structure of the industry, but of course also around some of the dynamics. And although we will not talk in this session a lot about the capabilities of the new companies, because it's more about the market, nevertheless we will also make clear here why we think we are best positioned to wrest the benefits from the future.

We have prepared basically the following chapters, we will talk a little bit about the case for investment, so why are these markets attractive. So secondly the global Ag market, so a little bit of the structure of the market. Then very importantly third chapter planting decisions, so how does a key decision-making process for our customers look like. And then ultimately creating solutions for farmers, basically our path from products to tailored solutions, and then you will find in the material a quite comprehensive appendix also with some more explanations. We intend to go through the material in probably half of the time, so we have then also enough time to answer some of your questions.

Let me start with the need for innovation, innovation which is really needed and driven by some of the mega-trends in our industry. We can summarise it with producing more with less resources. We will have 2.2 billion people more on the planet by the year 2050, plus we will see a further shift in diets everywhere. We have seen that already, because already today compared to 40 years ago we all eat 45% more meat, eggs or milk, so a very different diet. We would expect this to also proceed in the future, and then there is the significant challenge we believe of climate change. This will impact agriculture more than probably people think right now, and innovation will actually help farmers, and need to help farmers, to cope with the challenge, because we will not be able to expand more land for agriculture, but on the contrary, it will probably be less.

Innovation is required, and innovation – we will see this later on – will actually happen also very much at the interfaces of the different technology platforms. This is why we are also so excited

about bringing these two companies together. So, in a nutshell, science for better life is also the right slogan for our part in our division in Bayer.

Land is precious. Land is precious, because only 3% of the earth's surface is arable land, and we will not be able to expand this furthermore. On the contrary, because of urbanisation, but also climate change, there is actually a high risk that the arable land will be shrinking in the future. So we will need to produce more and actually also better quality on this land going forward, and if we just think about a few key areas, just the productivity increases in our industry over the past 35 years have saved the land of 1.5 billion acres, which is roughly the size of the Amazon rainforest. So if you just think about the sustainable, let's say, contribution that innovation has brought to agriculture already it is quite amazing.

Looking forward, if we are about to meet the challenges and the demands of the next 30 years then this would require, without productivity increase, another expansion of land by 700 million acres, or roughly the size of Argentina. This is actually quite mind-blowing and probably also underestimated in some of the discussions we have for sure in society right now.

Let's look at some of the demand projections for the future. We continue to see strong demand for our two main crops, soybean and corn. We have seen this in the past 10 years and if it continues on this trendline going forward, then the increase needs to come from a productivity increase ----- it basically means that the rate of gain for corn must double, and the rate of gain for yield increase in soybean must triple. This is a significant target for new innovation, and, again, we believe that this productivity increase will come from a combination of different technologies that will fit together, plus enabled by much better decision-making supported by digital. Innovation and digital capabilities will be key.

So, a few more insights and details of the structure of the market. I know that most of you are relatively familiar with our industry, but if you look back maybe 30 years ago we basically had entirely different markets for seeds and traits, on the one hand, and crop protection, in particular chemical crop protection, on the other hand. Well, now, today we talk about a unified market of roughly €90 billion, and you see here on the right-hand side that basically 44% of that is either seeds or traits, so a significant piece. Still the chemical crop protection and biological crop protection market segments are very important and will also continue to be very important. Herbicide, fungicide and insecticide are very important tools, not just today in agriculture, but also for the future. The growth rate overall is around 3%, and we would basically see the seeds and trait markets grow a little bit higher than this 3% average, and the crop protection markets in general a little bit lower.

In general, for fungicide right now we would expect some higher growth rates for the next years to come, and, as I said, it's quite interesting to see that only a few decades ago these were entirely separated markets, whereas right now all of the big Ag players operate on both sides. And this is not only driven by technologies, for instance, the use of biotech that, of course, has brought those two segments together, but also by the behaviour and needs of farmers, and I will come back to that in a second.

If we look at the value by crop of the market, we see that four key segments and key crops make up about 70% of the entire markets, cereals, corn, soybeans and horticulture, and this is also the reason why we are investing in these core key segments. You also see – and you were probably aware of the importance of soybean and corn and cereals – but horticulture is also a key investment area for us, and it is quite often also underestimated in terms of the value, but also margin potential it brings to our industry.

Talking about the planted areas leads me to my next discussion. Growers make one very important decision at the beginning of the season and that very important, and very often also quite emotional decision, is about what crop to plant, and that decision is driven by a variety of things. Commodity price is one, the trade situation and tariffs is a second, but also the availability of technology and inputs are another one. If we look at some of the economics that influence the decision of a grower, obviously commodity prices are important, and particularly in the big markets in Latin America and in North America, play a very important role.

What we can see is actually a decline in the stocks-to-use ratios for wheat and corn, so basically the global inventory of the crop divided by the annual use for the crop, and that usually is an indicator that commodity prices will go up. We are not yet seeing that really and we think this is also related to some of the trade uncertainties, and the ongoing discussions between the U.S. and China, but absent the trade discussions, we would see this as a positive signal going forward.

We see some, particularly for wheat, but also for corn, some uptick of prices and we just have to see now for the next months to come of how this plays out. But in general prices for commodities are at the lower end, and that was also part of a discussion this morning ----- of when we would see an upturn of these prices. You already heard from Liam, but also Wolfgang Nickl, that we have not built this into our numbers. So, if such an upturn would come we would also be able to create upsides, more and better than any of our competitors, given our footprint and our innovation lead.

We believe, and we are very much convinced, that with the footprint we have, with the technology advantage we have, if such an update would come we are much better positioned than others to benefit from it, and this is basically also one of the key takeaways from this afternoon's session.

I'd like to shift gears again a little bit now and talk about the decision-making of our customers, farmers globally, and also link this to the concept of tailored solutions and explain to you a little bit of how we think about it and why we believe this is an important aspect, and somehow a new aspect which is now really coming together, because of also the digital capabilities that the industry, but in particular, we have.

Growers start the season with one very important decision, and this is, 'Which crop do I want to plant?' and from that decision a lot of very important follow-up decisions are taken and that very first decision also determines some of the following ones. So, we have clustered that in about 40 key decisions a farmer will take, and then, of course, our farmer customers are looking for the best possible package to actually manage through the season. This, we believe, is why we are best positioned, because one of the main drivers for this acquisition is our capability to combine a best-in-class seeds and traits portfolio with a best-in-class crop protection portfolio, underpinned by digital capabilities.

What this really does is that with our capabilities we have very detailed information, not only about a region in a country, but actually about the specific field that each grower has, and actually about each and every square metre that this grower is farming, and that allows us to actually provide him with much better recommendations about the choice of seeds, the number and the amount of crop protection product he eventually needs, but also alerting him about the right application time. And we are also in the very early days of piloting different innovative business models, as we have heard, such as providing him with information and also more, let us say, more comfort that certain crop protection applications will get him the right return on investment.

Let us have a look then at those 40 key decisions. It starts with the planning process, and here in particular of what kind of crop and then variety a farmer will choose, weed control programmes, plant populations, so very important decisions that farmers make very early on, but then managing

through the entire season is a very complex process. It is a very complex process, because there are many external factors influencing what is going on in the field. Most farmers are basically making decisions based on experience and, of course, also the knowledge they have. They have a lot of data, but they are just not yet able really to have one simple system, which helps them to manage through that process. This is where those digital capabilities that we have come into place and play a significant role to optimise the entire process.

A farmer spends a significant amount of his budget on seeds, on crop protection, on operational expenses, and on fertilisation, and optimising all that is crucial, and I will show you a few examples in a minute. But here I just wanted to highlight again in order to optimise this process digital capabilities, this is really the new thing, this is what will allow us to give much, much better information, because we can do it in a very targeted way. It is not about having average knowledge about the performance of our products. Now we really have the knowledge of how these products will perform under his or her specific field condition. This is what we believe will enable for the first time this concept of tailored solutions, because we as an industry have been talking about this for quite some time, but here really this will make the difference. And, again, with our knowledge base and experience in both seeds and traits, and crop protection, plus the leading digital platform that you will see in one of the follow up sessions, this will be very powerful and will help farmers to make much better decisions and also optimise their return.

Now I'd like to share a few examples here on where growers spend their money. Three examples, corn US, soybean US, and wheat in Europe, in France. The main pockets of costs for them are in the area of seeds, crop protection, fertilisers, and then general operational costs, and, as you probably now can understand, the selection of seeds, plus the selection of crop protection products, plus the way and recommendation of how this will be applied, influences those other pockets. We have talked about some technologies that maybe in the future will help us to optimise nutrition, or maximize fertiliser impacts. Those solutions that we will be able to offer farmers may help them also to reduce or optimise their operational costs.

So these are important additional value pockets that we are able to tap into, on top of the €90 billion market we are operating currently in. And, again, here it is all about bringing transparency to farmers about what products can do and cannot do, but if you have the leading technology portfolio then transparency is a good thing. Transparency helps to optimise the decision process and can create value along the entire value chain. Plus, it will also help to reduce the environmental footprint and the use of natural resources, because with that we are also able to reduce, for instance, water usage, and actually will allow them to have higher yields and higher productivity.

So, again, the key message here is we firmly believe that our new company will be able to provide a more holistic solution, plus we will be able to tap into some traditional value pools as well. In terms of when we usually sell in Europe and in North America, it is usually in April / June – April / May / June – depending on the crop. You see here for the U.S. the example of corn and soybeans. Seeds is typically sold three to five months in advance, so, this is why January, February, March are important sales months for us. There is a significant part of agriculture in the Northern Hemisphere, so this is why the first quarter is important for us.

For crop protection it is all about protecting yield, and the decisions for the use of crop protection products are taken during the season. So, you see those actually more aligned with the application, which comes later, and this is also why the sales season for crop protection products, both biological and chemicals, is more balanced throughout the year. Obviously for the southern hemisphere it is the other way around, so planting in Brazil, for instance, happens in January / February. Their seeds are also typically sold three or four months' in advance, so the seed sales, for instance, would come in during the third quarter.

Let us come to why the combination of both companies and the combination of those portfolios are so important. If you just take soybeans in Brazil, for example, with the breadth of solutions and products that we have, and now can combine to a tailored solution for our customers, really brings the best technology options together.

These capabilities will help us, and agriculture in general, to progress and master the challenges that are ahead. They will enable growers to maximise the potential of each acre, and each part of the field, because the variability in the field is quite substantial. Growers will be able to, in a very targeted way, maximise the potential of every part of that field. Managing operations really efficiently is key, and data science will allow us to improve this, but, and will also help farmers to optimise some of their other areas where they spend significant money, such as on fertiliser. So the combination of these solutions will enable us to move actually from product sales into a solution-based sales, with the opportunity also to develop new business models.

So finally, to recap, the environmental, but also population challenges will require a significant increase of productivity. And here, again, it is all about how we can produce more and better with less natural resources. Our business is clearly to help farmers to broadly optimise their entire operations, through the use of data and more sophisticated decision models, and we feel very confident, because we believe that we have the competitive edge in each technology area we are operating in, be it in the area of seeds, traits, chemical or biological crop protection, and also in digital.

We are very excited now to finally start this new journey. We could already in the past weeks see that just by bringing the teams together a lot of new ideas were born, which could come to the market relatively quickly, and then, of course, we have these more long-term opportunities to develop entirely new products, which are perfectly aligned for future use.

Thank you for your attention, and with that we can move to the Q&A.

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