

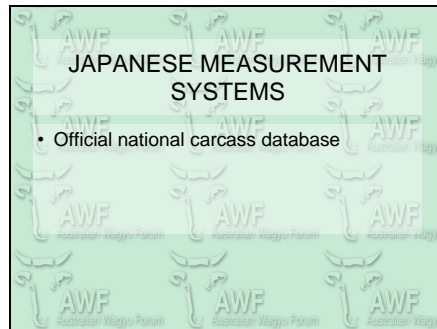
Slide 1



Welcome. Thank you for your interest. What we are looking at in this session are tools to help predict the performance of fullblood Wagyu outside Japan; with a particular emphasis on Japanese approaches that might readily be applied here. Due to time constraints, this is going to be at headline level.

And most of the focus will be on the marbling trait – because that is how the West came to Wagyu. We will also look at the concept of economic production – that is yield plus marbling. You can find much more detail at our website and I will post this presentation there so review it later.

Slide 2



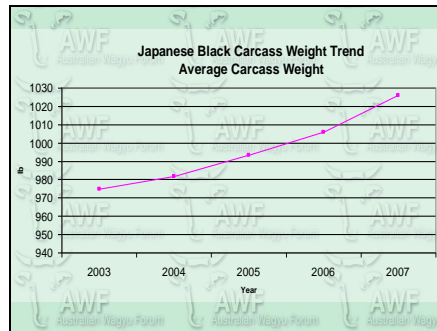
Let's first consider how things are done in Japan.

Let's say we start with a wonderful looking animal with a fantastic pedigree. This means absolutely nothing.

In measuring success in Japanese Wagyu production, you start and finish with carcass performance. This is the only essential criteria in determining success and reward.

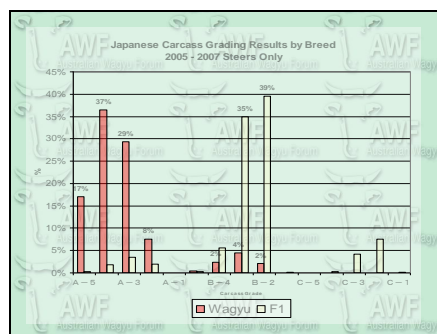
It is considered so important that Japan maintains a national database for recording Wagyu carcass performance, and national Wagyu carcass data collection and reporting is a Government function, just like USDA grading here in the US. Japanese sire rankings are based on centrally collected carcass data. Here's a quick look at a Japanese carcass summary.

Slide 3



You can see your typical weight off about 600 days on feed is . . . . , which is higher than most currently achieved in Australia

Slide 4



Not all Japanese Wagyu is A5 BMS 12 white beef.

Slide 5

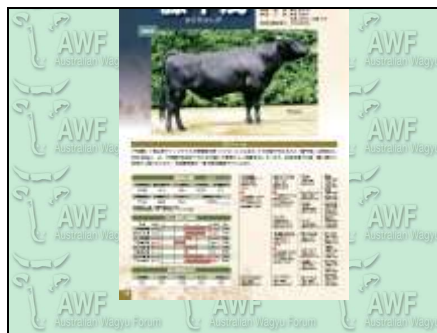
### JAPANESE MEASUREMENT SYSTEMS

- Official national carcass database
- Unique Japanese SBV system

Japan has a sophisticated SBV system – similar in intent to US EPDs to some extent. However, it relies heavily on official data collection at Japan’s prefecture - or state level - and is informed by the official carcass results I just mentioned. So, Japanese SBVs are dependent on a foundation of high integrity, official, national data. Beyond this, very heavy emphasis is placed on official progeny testing programs for sire selection.

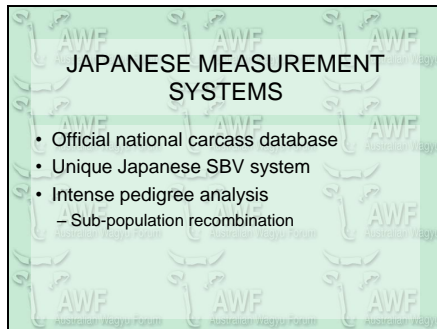
That I am aware of, nothing similar is available in any other national cattle industry in the world. If you want to go further into this, there are a couple of Meat Science magazine articles referenced on our web site that compare USDA and the JMGA systems. See the Tajima strain section for these.

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This is an example of Japanese Bull Book. As you can see, SBV is indicated for each sire.....

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Finally, we have pedigree analysis. I think the Japanese obsession with pedigree analysis is probably similar to old time cattle breeding here in the West. Breeders knew every animal and sought unique and extraordinary results from very individual combinations.

There is an excellent reason for this to have continued in modern Japanese Wagyu breeding. That is because with Black Wagyu we are dealing with several well-recognised genetic sub-populations within the breed, each with defined, heritable traits. Such a situation within a single breed does not lend itself to any one-size-fits- all predictive system. It is essential to understand both the traits of each sub-population and the way combinations will behave - as expressed in carcasses.

And there lies the key: successful modern Japanese Wagyu production is all about combinations: specifically, the successful

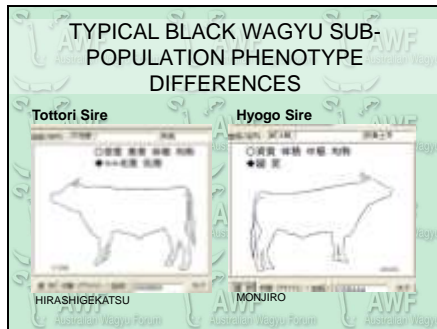
combination of sub-population genetics. Even in modern, genetically melted down Japanese herds, persistent sub-population traits and heritabilities linger on - and have important influences on results. That is also a key reason for the heavy Japanese emphasis on progeny testing for sire selection – because when you combine sub-population genetics, outcomes do not always go according to plan *and they are not always scientifically logical.*

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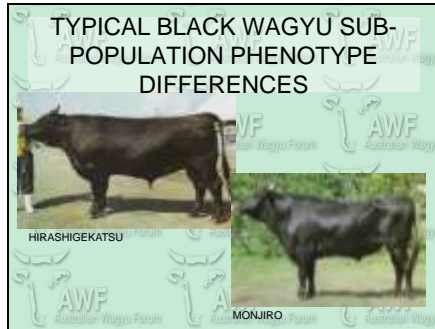
One positive thing about this for non-Japanese breeders is that all the information you need to consider combinations is right here in your English language pedigree. Once you have figured out what combinations exist within the animal, then what result is likely arise from a particular mating combination, you are making essentially the same plan as a Japanese breeder. It can be done successfully.

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We don't have time to go into the history of prefectural Wagyu breeding in Japan, but this next sequence of slides illustrates significant physical differences between sub-populations in two important prefectures.

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Tottori is the home of the Kedaka strain; Hyogo of course the home of Tajima and Kobe beef. Geographically, these very different herds evolved right next to each other on Honshu.

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**Progeny Test Results**

	<u>Tottori</u> (HIRASHIGEKATSU)	<u>Hyogo</u> (MONJIRO)
• ADG(lb/Day)	2.24	1.93
• CWT(lb)	832	739
• BMS	3.3	3.3

If we looked at this as data through the eyes of a modern Japanese breeder: a profitable objective might be getting all that great Tottori growth into Hyogo frame. I've used Hirashigekatsu here to show a unique prefectural outcome in marbling. Traditionally, even in Japan – Hyogo genetics have been employed for stabilising marbling. But if you look at the top 2007 bulls of Japan - also on our website, you will see that this is changing, and Hirashigekatsu was a leader in this change.

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**WESTERN RELEVANCE OF JP MEASUREMENT TOOLS**

• Carcass database:	No
• JP SBVs	No
• JP Progeny Test	No
• JP Pedigree (16/16) Analysis	Yes

Breeding Wagyu in the West quite clearly lacks many of the inputs available to the Japanese breeder. This is not as bleak as it looks. If the non-Japanese breeder understands his pedigrees and the different performance parameters of the different sub-populations – which is not extraordinarily difficult – then a good start is possible. Before we look at applying this tool here in America, what other Western tools might we consider ?

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**WESTERN PERFORMANCE MEASUREMENT TOOLS**

- Carcass Feedback = Mission critical
- Gene marker technology

As stressed up front: the carcass result is the only thing that matters in the end. And marbling is the critical carcass requirement. So let's look at the available tools for predicting marbling. First you need to measure it and the only real proof is in the carcass, so carcass feedback is mission critical. Although it is most unlikely that there will ever be a national database of Wagyu carcasses anywhere outside Japan, there is an established tradition in Australia of feedlots providing carcass results back to breeders. It makes great sense for everyone. Every breeder/feeder deal should include provision of timely and accurate carcass data. Nothing is more essential.

Next, let's consider gene marker technology. This undoubtedly represents the future of breeding prediction in cattle. It is already used extensively in Japan for predicting recessive diseases. And there are also Japanese marker tests for predicting trueness to type and fatty acid disposition of Wagyu.

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**Marking Results**

The marker offers an initial indication of marbling ability, but it is not a guarantee of marbling ability. The marker offers an initial indication of marbling ability, but it is not a guarantee of marbling ability. The marker offers an initial indication of marbling ability, but it is not a guarantee of marbling ability.

Ref: Beef CRC 'SmartGene' 2008  
<http://aobu.une.edu.au/SmartGene%20Report11.pdf>

Where we need to be careful is where marker predictions are applied to marbling – here the proof is still lacking. I suggest reviewing the information at the Australian CRC for Beef website, or look at this joint developers statement from 2008 in this context. You can find the links under Predictive Tools on our website.

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**WESTERN PERFORMANCE MEASUREMENT TOOLS**

- Carcass Feedback = Mission critical
- Gene marker technology
- EBVs/EPDs = global scientific recognition

There are undoubted successes - you would all be aware of successful Western predictive marker products for traits like tenderness.

Moving on, EBVs and EPDs are recognized in animal science as the most important selection tools currently available to cattle breeders worldwide. We absolutely agree with this. However, it also needs to be noted that EBVs are not used in typical Western cattle production in the same way that a Japanese breeder would employ such a tool.

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**EBV's**

Table 3: Carcass results of high and low IMF EBV sires

	Average IMF EBV index	Predicted difference in IMF% of carcass based on EBVs	Average progeny carcass IMF%	Average marbling score
Top 5 sires on IMF EBVs	1.1		0.8	2.8
Bottom 5 sires on IMF EBVs	-4.3		0.8	2.4
Difference	5.4	0.8	0.0	0.4

MLA Tips & Tools "The accuracy and success of EBVs"  
<http://www.mla.com.au/NR/rdonlyres/8772E9F5-857E-4B95-A668-1520881F3521/0/TipstoolsAccuracyandSuccessofEBVs2006.pdf>

This slide shows part of an EBV advisory based on a real life trial in Shorthorn breeding from the peak body for red meat production in Australia – MLA – dealing with EBVs for carcass data, and IMF specifically. The Japanese breeder would be pleased to see that the IMF results are verified with actual carcass data, then note the relatively small marble score difference between the top and bottom sire groups. But the biggest eye-opener for the Japanese breeder would be the 100% reliance on sire data – an assumption of no knowledge about the 50% female component. In Japanese fullblood breeding, the female side is at least as important as the sire side – all joining decisions are made after careful evaluation of BOTH sides and an estimation of how this recombination will perform. No Japanese Black Wagyu breeder would proceed with so little dam knowledge.

Let's now have a look at how Japanese

16/16, gene marker technology and EBVs compare when we put them all to work in retro-analyzing a real top ranking Wagyu sire and his progeny.

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Hirashigetayasu Hongen

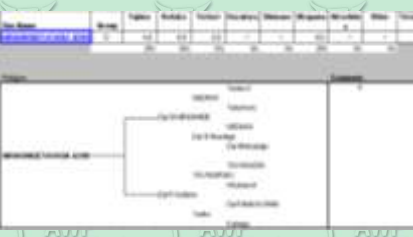


ADG lb	BMS	EMA 5/6 Rib	Backfat	Carcase Yield %	Av. Carcase Grade
2.15	2.4	45 cm2	1.9	73.3	A.4.7

With genetic rights now owned by AACo in Australia, this bull was born in Japan and achieved Hongen status – the highest available – with ZENWA, the Japanese breed society. Japanese progeny tests prior to his export showed that 80% of male progeny carcasses would achieve a JMGA grade of A4.7. The highest grade is A5. In short, Hirashigetayasu is shown to offer great yield and very superior marbling based on actual carcass proof and proven Japanese systems. It is important to note that the low BMS score you see here is related to early slaughter during the progeny test – to achieve the A4.7% average, all finished carcasses would be over JMGA BMS 8.

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Hirashigetayasu  
16/16 Analysis

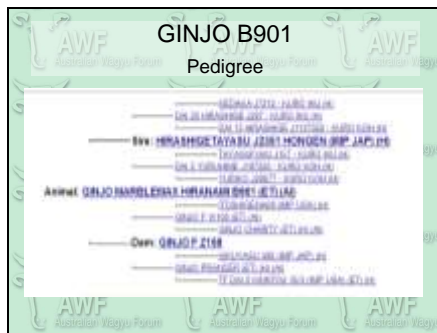


If we do the same assessment using Japanese 16/16 pedigree analysis, after assessing and ticking off his specific parentage, we identify 25% Tajima, a total of 50% Tottori and 25% Okayama bloodlines. Given parentage and sub-population trait data, we can readily predict that this animal should feature good marbling with markedly superior growth. Heifers of this breeding should show enhanced maternal traits.



traits the overall chart correctly predicts –on the basis of an inaccurate ultrasound interpretation that contradicts the superior marbling outcome established through a formal Japanese progeny test.

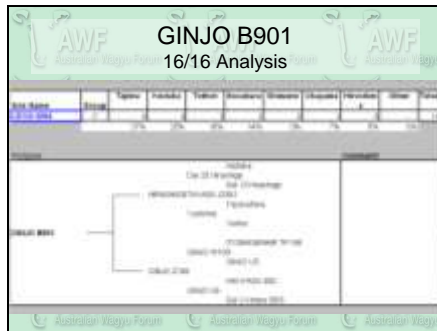
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This trouble then leaps generations and we see how it effects an real Hirashigetayasu son.

First, we look at him in 16/16 strain analysis,

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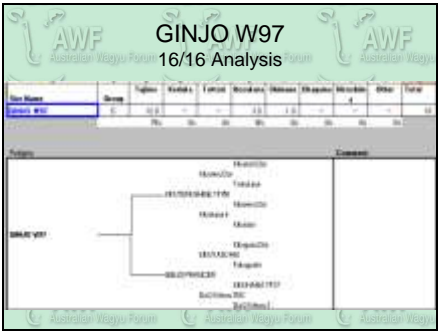


We assess the combination of his sire and dam. We identify superior dam side marbling heredity from top Hyogo sires. TF 148 in contrast has a very high IMF value in the group Breedplan. Kikuyasu 400 was the largest Tajima bull exported from Japan. Overall, B901 looks well balanced for superior growth, yield and marbling, perhaps with a little less to offer female progeny than his sire.



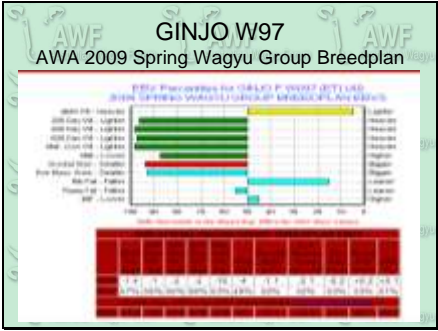
that: big growth with marbling. Which is exactly what we get. Good growth, good carcass weight, excellent marbling. No rocket science needed.

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Let’s look quickly at another carcass outcome from a Hirashigetayasu joining. Note that the dam of the cow here is the same tested foundation cow as for Z158. W97 is a small animal with over 75% Tajima bloodlines and some Itozakura balance – so while we hope for some incremental growth from the large sire in our joining, growth is likely to be just moderate. We remain seriously optimistic on the marbling outcome.

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It’s interesting to see that in 2009 EBV graph agrees with us generally, but is only cautiously optimistic on the marbling side. So what’s the outcome ?

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GINJO W97	
Actual Full Sibling Carcass Data	
• DOF:	525
• ADG	1.67lb
• HDCW	829.4lb
• EMA	47
• BMS	10

Once again, the pedigree analysis is generally accurate. Growth and carcass weight is down. The eye muscle area performance is well ahead of what we might have predicted from the dam – but not from the sire. Marbling is excellent. A good result from a small cow. Let's go back to EBV IMF predictors

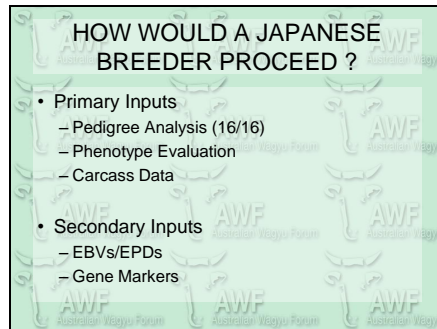
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Questions Arising:	
• How do EBVs account for marbling performance differentials between major sub-populations ?	
• How useful are WY marbling EBVs without carcass proof ?	

I should mention that Hirashigetayasu is not the only bull where the current group Breedplan IMF EBVs are demonstrably inaccurate predictors if they viewed in isolation – that is, outside combination strategies with carefully evaluated females, and especially where those females are drawn from unique sub-populations. I suspect many high growth, non Tajima bulls might be similarly impacted – notably TF 147 Itoshigefuji.

On the highTajima side, supreme marbling predictions for very highly inbred Tajima joinings may also be similarly incorrect. In reality, there is a limit to trait fixing in extreme line breeding.

All of this will be redressed when carcass data supports Group Breedplan for Wagyu. I know this is coming. Let's hope its coming soon..



In the meantime, I would like to conclude by detailing how a Japanese operator might proceed to plan his breeding in this non-Japanese environment here in Reno, without a complete set of Japanese tools. There is no rocket science here. Nothing beyond any competent cattle person. And nothing much beyond what you would hear at any Western beef cattle evaluation course.

The first, most basic thing I am going to do is dissect both sire and dam pedigrees into their various strain components: How much Tajima ? What Tajima/Hyogo families are involved – so how much Yasumidoi, how much Nakadoi, how much Kunanami ? This will help avoid inbreeding difficulties.

Then, how much Kedaka/Tottori, how much Itozakura. This is where I am going to find growth for enhanced yield, maternal attributes and genetic spread. I start with detailed analysis of my female. Let's say the cow is high Tajima, more than 75% and my progeny target is a median/high marbling carcass BMS 7-9 outcome with superior yield and less days on feed.

I might set my total Tajima inputs to 50% or 8/16 and look for a growth/yield balance in Kedaka or Itozakura bloodlines. We know Hirashigetayasu for example is 25% Tajima with mighty growth. He fits. So I pencil in some joinings.

The second thing I am going to do is eyeball the animal. I will check weaning weights on both dam and sire side if I have them, evaluate early growth, estimate frame scores. Is this a high or low growth phenotype ? Has this animal performed to the promise of its pedigree ? If not, was it set back. If the animals are much larger or smaller than the pedigree indicates, I will possibly vary the joining.

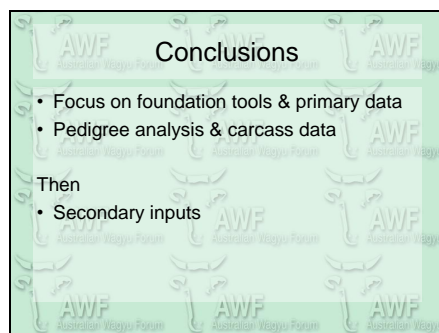
Then I go back to the office and look for carcass data for similar combinations. If I have been in the fullblood game for a few years, the chances are I will take the common sense route

and repeat successful combinations based on feeding outcomes. Every Japanese farmer does the same.

Then I turn to what I would call abstract inputs. This is data that predicts outcomes I have not actually experienced, based on statistics. I would want to know exactly what foundation data was used – is it scans and carcass data, or just scans? I would then look up my sires on the EBV database, and then dams using sire progeny data to see how similar joinings to my plan have performed on average. Do my 200 day weights fit with the 200 day EBV number for similar breeding? If there is any conflict in the data, I would stick with my own actual outcomes and predictions ahead of any statistical prediction.

Finally, I would consider any gene marker information that might be available.

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**Conclusions**

- Focus on foundation tools & primary data
- Pedigree analysis & carcass data

Then

- Secondary inputs

So in this very new environment of breeding fullblood Japanese cattle outside Japan, my strong recommendation is focus first on getting absolute understanding of the essential primary tools. In all kinds of animal breeding, for centuries, the prime tool has been the pedigree. And a carefully dissected Wagyu pedigree contains an enormous amount of valuable predictive data with the added benefit of an ultimate check and balance: that is, carcass information. Nothing else matters at the end of the day, so you must negotiate to get this data.

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All of this leads to one goal – the carcass is king – and the carcass data is the final measure of your achievement. The key lies in understanding and successfully predicting outcomes of the combination and re-combination of sub-population genetics from a not-too-complex , but certainly unique breed. The Japanese Black Wagyu.

Thank you.