

# ***A series of “Saki-Hikari” for koi fulfilled with another item added***



*Kyorin’s “Saki-Hikari growth diet for koi” is a new diet to make a proportional body and encourage the growth of koi*

*Recently Kyorin Co., Ltd. has put its new “Saki-Hikari growth diet for koi” on the market. The growth diet is the newest one in the existing line-up of “Saki-Hikari”. This is the diet focusing on the calorie balance of the ingredients to protect koi from troubles of internal organs. It is also the diet producing a surprisingly good effect in growth with feed efficiency of 120 percent. Here we’d like to introduce the details of the item to you readers while talking about its characters with Keita Harada of Kyorin’s Yamazaki Research Institute and Nobuhiro Yagi of Kyorin’s Planning Department.*



Nobuhiro Yagi of  
Kyorin's Planning  
Department



Keita Harada of  
Kyorin's Yamazaki  
Research Institute

### Safety and balance are the point of the growth diet

—Would you please explain the new item “Saki-Hikari growth diet” in detail?

**Harada:** To say in a word, this is exactly like what it is described. It is the diet to make koi grow fat and big. (laughs) It belongs to the top class of our items in view of the growth effect. Here I'd like to explain our new product “Saki-Hikari growth diet for koi” on the basis of our experimental results.

To begin with, what is the image you have when you hear the word “to grow fat”?

—To be obese, isn't it? It is like a middle-aged man who puts on fat because of excess of fat. (laughs)

**Harada:** We usually associate “to grow fat” with “to take too much fat.” Let me give you an example. Suppose that we compare a heat value of a carbohydrate, say rice, with that of a fat, say oil. One gram of fat has a heat value of 9.4 kilo calories, in the meantime one gram of carbohydrate has only 4.13 kilo calories. That is, they have the same fat content, but they vary in calorie badly. This difference in calorie becomes the cause of stoutness. By the way, protein has 5.65 kilo calories per gram. Therefore, if you want your koi to grow big rapidly, you have only to add fats to the diet.

This is common knowledge to us, and it is not good for health to take too much fat. The same is true of koi. If koi are supplied with too much fat in defiance of its proper usage and its amounts to add, they sometimes lose their health. This is because fat is

accumulated in the abdominal cavities of koi. **Yagi:** Fat accumulation inside the fish body causes a saggy belly, and it sometimes causes troubles of internal organs under pressure.

**Harada:** The “Saki-Hikari growth diet” is a well-assorted feed produced in due consideration of required energy and nutriment for koi, and the caloric calculation which has previously mentioned. The diet focuses on all the nutriment, not only fat, but protein, carbohydrate, and so on, so that it may make a proportional and calorific diet. This is a characteristic of the “Saki-Hikari growth diet.”

—Is there a big difference in assured nutriment between this new diet and the other old ones?

**Harada:** Apparently it may be hard to tell them apart. The new diet has an assured protein content of more than 40 percent, which is the same as the existing diets like “Saki-Hikari breeding diet” and “Saki-Hikari color-heightening diet.” However, the proportion of fat in “Saki-Hikari growth diet” is a little higher than the others.

For example, “Hikari Wheat Germ” has an assured fat content of more than 4 percent, “Saki-Hikari breeding diet” more than 6 percent, “growth diet” more than 9 percent. If we want to make the best of the high heat value that fat has, we consider the assorted amounts of this much to be reasonable.

—Isn't the protein content lower for the growth diet?

**Yagi:** Yes, you may think so. Because some of other commercial assorted feed contain more than 50 percent of protein. More than 40 percent of the assured protein content seemingly is much lower. However, I don't agree in the opinion that the diet rich in protein is always effective to make koi grow fat. It's a rather dangerous idea. The protein that koi eat must be the protein that koi can digest and absorb. We manufacturers should select ingredients and blend them with a proper percentage.

### Growth effect to be learned from the results of the experiments

— Then, will you explain of the substantial

### Items

The new six items below listed on the existing Saki-Hikari diets series 18 items

names of items		sizes		weight	form
<b>‘Saki-Hikari’ growth diet floating type</b>	yearling fish use	S	2.7~3.0mm	15kg	EP pellet
	adult fish use	M	5.0~5.5mm		
		LM	6.5~7.5mm		
<b>‘Saki-Hikari’ growth diet sinking type</b>	yearling fish use	S	2.7~3.0mm	20kg	EP pellet
	adult fish use	M	5.0~5.5mm		
		LM	6.5~7.5mm		

### A table of ingredients and assured ingredient content

#### 1.used materials

classification	materials
animal diet	fish meal, shellfish meal
grains	flour, wheat embryo buds, gluten meal
vegetable oil	soybean cake
others	fish oil, beer yeast, powdered sea algae, digestive enzyme, garlic, living bacteria, amino acid, vitamins / minerals, vitamin C

#### 2.assured ingredient content

crude protein	crude fat	crude fiber	moisture	ash
Min. 40%	Min. 9%	Max. 1%	Max. 10%	Max. 17%

effect of “Saki-Hikari growth diet”?

**Harada:** Yes. Our Yamazaki Research Institute has conducted repeated feeding experiments so that we can obtain accurate data of its growth effects and safety levels. Here I’d like to show you part of it.

When we examine the growth effects of diet, we use a value of feed efficiency. The value is described by the percentage of the feed given to the feed accumulated in the body. The diet with 100% feed efficiency, for example, is the diet that has koi have a gain of 100 grams. That is, koi gain 100 grams by eating 100 grams of feed.

**Yagi:** It is a matter of course that the results of diet vary according to living environments, so feed efficiency even to a certain

diet is not always fixed. However, if feed efficiency in a fixed environment is compared, ability difference in diets will be examined.

**Harada:** See the bar graph. It reads the comparison of feed efficiency of our diets. This experiment concludes that “Hikari” has a 73 percent feed efficiency, “Saki-Hikari breeding diet” 93 percent and the newest “Saki-Hikari growth diet” 120 percent. These figures show that the koi got heavier than the diet amounts they ate. What a magical diet this is! (laughs)

—The increase in weight is much larger than the diet amount the koi have eaten. It can’t be true, isn’t it?

**Harada:** Originally, water content of the diet is less than 10 percent, but 70 to 80 per-



A line of display booths at the site of the 34th All Japan Combined Nishikigoi Show

cent of the body of a koi is water. That is, the koi distend its body by water, so it gains much more weight than the weight of the diet it eats. That is no reason what the supply of “Saki-Hikari growth diet” makes a water balloon-like flabby koi. (laughs) The “Saki-Hikari growth diet,” in the same way as other diets, can make koi grow big while letting them to have a well-muscled body. The diet which has done so good in promoting the growth of koi is epockmaking.

— This is a figure reading the feed efficiency of “Saki-Hikari growth diet,” isn’t it?

**Harada:** This is the result of a three-month-long experiment made by using yearling fish 8.2 centimeters long, weighing 11.4 grams. The aquarium we used for this experiment is 60 centimeters long and the water temperature is 26°C. The feeding ratio at the time of experiment is about 3 percent per fish body weight.

We used our “Hikari Wheat Germ” and “Saki-Hikari growth diet” for experimental diet. As you see, there is a big difference in growth. The yearling fish which ate “Saki-Hikari growth diet” have proved to be nearly eight times heavier than their original weight of three months ago. In addition, they are nearly double the weight of the other yearling fish which ate “Hikari Wheat Germ.”

**Yagi:** When you compare a 90 percent feed efficiency diet with a 120 percent diet, you may think that there is only 30 per-

cent difference between them, but actually here is a big difference between them. You don’t know it until the growth reaches its final stage. The koi grow up by the feed they were given yesterday, and today they eat more feed than yesterday. Difference in growth goes wider and wider day by day. From this reason, the difference amounts to be more than two times in three months.

—The yearling fish will considerably grow big until the autumn because this diet has turned out to be effective for the rapid growth.

**Harada:** Yes, I think so. Particularly during the season from summer time to early spring, the diet is supposed to work most effectively. Because this is the season when water temperature is high and the metabolism of koi is high, too. If you want your koi to grow as big as possible before the koi see the season when water temperature goes down, this diet will be of great use.

### Not become too fat, but stay healthy with good growth

— How many times a day did you give the growth diet for experiment?

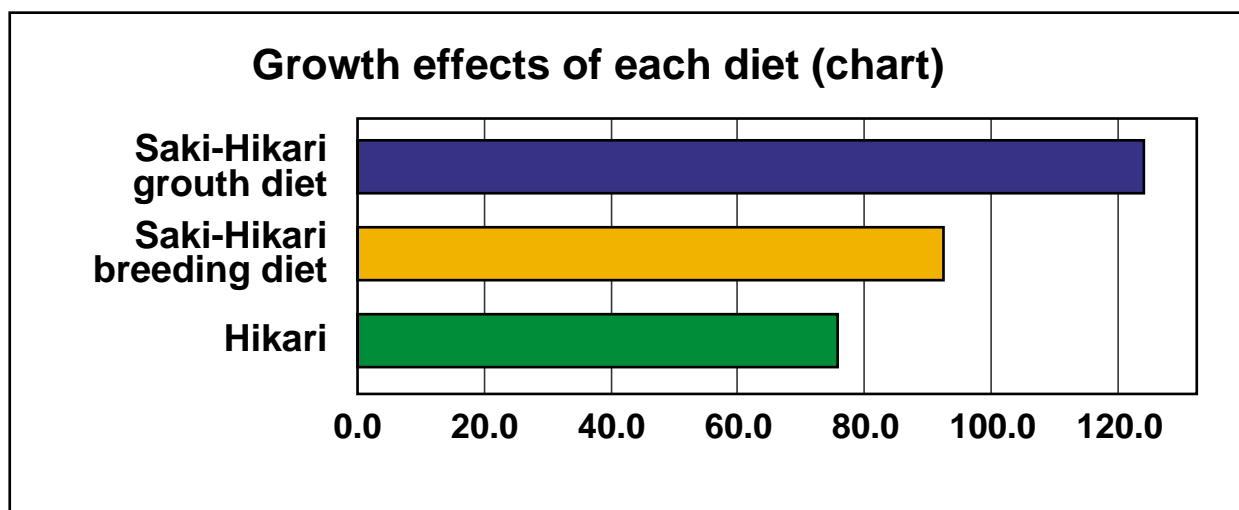
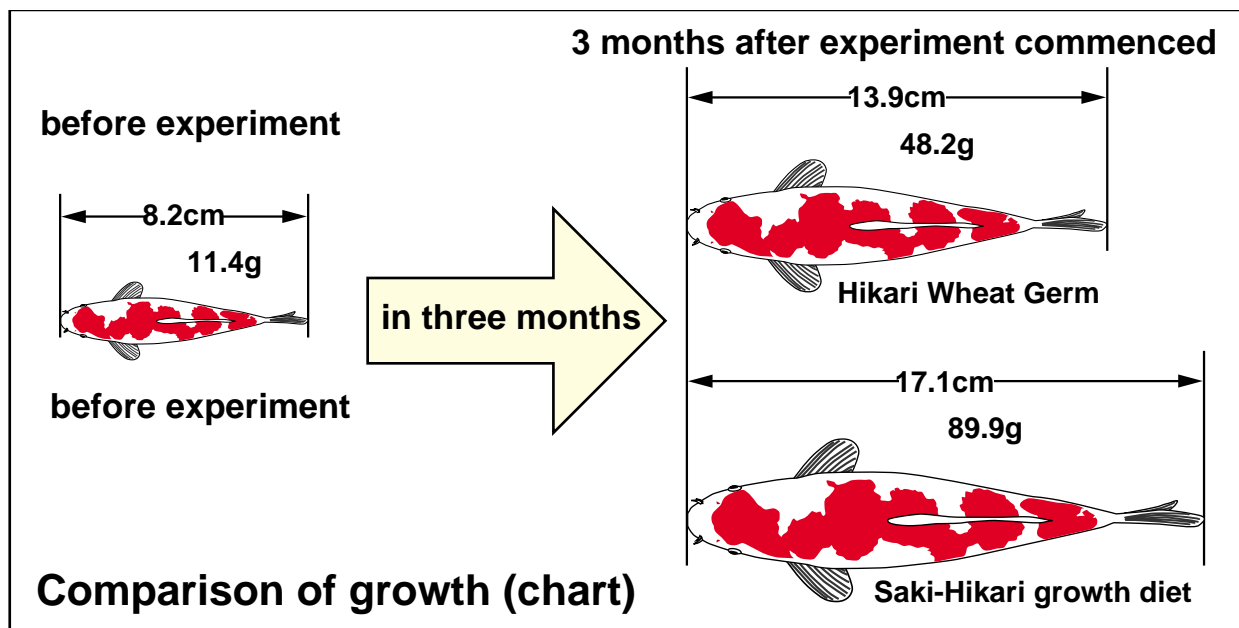
**Harada:** It depended on experiments. Feeding ratio per day is 2 to 4 percent per fish body weight and diet frequency is three to five times. Considerable amounts of feed have been given according to the purpose of the experiments.

— Doesn’t the feed of that much cause koi to lose their figures?

**Harada:** I understand that you care about their fatness because the growth speed is so fast, but you don’t have to worry about it.



Three different-size pellets; Sizes S, M, LM from the right



You can count on the results of the experiment that Yamazaki Research Institute has declared.

For example, it was experimented whether the koi could keep their good health or not by giving them “Saki-Hikari growth diet” alone for three months. Whichever diet the experimented fish ate, “Saki-Hikari growth diet” or “Saki-Hikari breeding diet,” it turned out that there was no difference between them in to what degree fat is attached in their internal organs. The growth diet doesn’t let fat to accumulate in the internal organs so easily. This is a characteristic of the new diet.

**Yagi:** This new diet has another character. It doesn’t cause a saggy belly. You may guess

that a supply of this growth diet alone causes a short and fat body. However, the fact is that the koi have grown proportionally.

**Harada:** We are examining the figure of koi by calculating the degree of fatness. Let me show you how to calculate the degree of fatness.

— Yes, please.

**Harada:** The degree of fatness is found in the ratio of the weight per body length. The formula is as follows : fish body weight (g) ÷ fish body length (mm)<sup>3</sup> x 10<sup>6</sup>. From our experiences. The koi with a standard fatness have a value of 26 to 30. The koi with a high level of fatness have a value of about 32. The value of more than 32 reads overweight. Reversibly, less than 25 reads that the koi are



too light in weight. (laughs) We quickly find out the degree of fatness and growth of the koi at the sight of the values.

**Yagi:** Even from the results of the three-month-long experiment we can find out that the experimented koi show a little change in fatness value though they apparently look stout. As a result, the koi have grown up proportionally and they have not lost ones figures.

**Harada:** If only the diet is given in a proper way, the koi can grow up without losing their figures. This is the conclusion of the experiment. “Saki-Hikari growth diet” can also be said to be the diet with high balance effect.

Here I’d like to refer to the word of body length. The body length covers the range from the tip of the mouth to the root of the tail fin. The range from the tip of the mouth to that of the tail fin is called full length. Koi vary from each other in the length of the tail fin. If calculations are done on the basis of the length of the tail fin, it is hard to learn the real fatness.

— Does the formula to find fatness apply to any koi?

**Harada:** There is a limit with the size. I think that this formula is applicable to the koi approximately 10 to 40cm long. The formula doesn’t apply to too short koi and too long koi. It is probably because the physique of a koi varies. In this case, you may as well judge whether koi are fat or not from the external look of their bodies.

### **The point is that a choice of diet varies with the water temperature**

— What would happen to koi if they were given the wrong diet or if they were given the right diet in a wrong way?

**Harada:** I’m sure that everyone knows it. If koi are forced to eat a diet specially rich in fat, or a diet is one-sided to a calorific diet particularly during the season of a low water temperature, which is the period of the koi’s having a low metabolism, it is certain that the koi should have trouble with their internal organs.

— We give chrysalises in the summer time

when koi have a high metabolism. Overfeeding is not good, isn’t it?

**Harada:** I think so. You know, a chrysalis is a diet very rich in oil. If chrysalises are all the diet koi have, they are supposed to suffer from excess of fat. In the meantime, it is also true that chrysalises, if they are supplied in the proper amount, are indispensable to the growth of koi. “Saki-Hikari growth diet” is a balanced diet including fat, so it is hard to cause nutrition disorder which is like the damage caused by chrysalises.

**Yagi:** The point of “Saki-Hikari growth diet” is that a single supply of this diet is good enough to koi. There is no problem with the health of koi even if no other diet is added. All that you have to do is to see how the koi are while giving them the diet.

I think that this new diet will be specially favored by breeders and dealers. It enables yearling fish to grow as big as possible by the winter and it enables breeders and dealers to select koi earlier than expected because of the rapid growth. Besides, the turnover of pond rises.

**Harada:** We are sorry for the death of the experimented fish. We made an experiment of killing the koi after giving them the new diet for a long time.

— What was the purpose of the experiment?

**Harada:** Investigation of receptivity to stress. We examined it by leaving the koi alone until they died after they had been taken out of the water so that we could gather data on their survival time.

— What was the result of the experiment?

**Harada:** You may guess that rapidly grown koi must be weak against stress. Actually, it didn’t make any difference. All the experimented koi, whichever diet they were given, had the same survival time. I’m sure that you’ve understand the characters of our new diet. We assure that it is effective for koi’s good growth and health.

Please be sure to try our new diet for the keeping under the heated circumstances or amid the wintering. By the way, this diet is not designed for the use of a low water temperature. If you want your koi to winter un-

der the unheated circumstances or if your koi are exposed to the low water temperature which drops koi's metabolism, we recommend the use of "Saki-Hikari breeding diet" or "Hikari Wheat Germ."

### Our main subject is to produce "evolved diets"

— How many sorts of "Saki-Hikari growth diet" are being sold?

**Harada:** There are three according to the size of koi: Sizes S, M, and LM. All the diets have two different types respectively: a floating type and a sinking type. So the diet totals six kinds. Each of the diets has the same ingredient contents. All that you have to do is to find the right feeding ratio from fish body weight.

—Some koi fanciers say, "The color of Hi becomes faint particularly in the summer time in spite that the summer time is a good season for the growth of koi." What do you think about it with "Saki-Hikari growth diet"?

**Harada:** The growth diet contains no color-heightening ingredients, so there is a threat of Hi spots fading if the growth of koi is promoted rapidly. You can make an alternative choice according to the breeding aim. When you aim at the entry of a contest or a perfect color enhancement, you may as well give your koi a color-enhancing diet alone. When your goal is set at the further growth, you may as well give the growth diet alone.

However, I don't mean that you shouldn't mix the growth diet with a color-enhancing diet. I'd rather tell that the advantage of a mixed diet is that their respective abilities are made uniform. For example, if you aim at enhancing colors to an extent that the colors can stay intact, I think it a good idea to use that mixed diet.

**Yagi:** Koi vary in growth speed and quality, so it is very hard to indicate the proper proportion of the growth diet to the color-enhancing diet for the mixture. That depends on your koi fanciers' abilities.

**Harada:** Let me change the subject. I want to show you something very strange.

—What are these?

**Harada:** They are Hikari bacteria cultured in agar culture medium. The Hikari bacteria are living bacteria added in a series of "Saki-Hikari." See the colonies of Hikari bacteria. They look like white holes were open here and there. Thousands or ten thousands of Hikari bacteria form a small, but visible colony. I just want you to see them with your eyes so that you can find out that a series of "Saki-Hikari" contain those Hikari bacteria.

**Yagi:** Our new diet come in packs of 15 kgs and 20 kgs, and it is available for one year. We think that one year at most is the right time limit to expect Hikari bacteria to display their abilities.

—It is said that the action of the living bacteria promotes digestion and lowers turbidity of filter media, isn't it?

**Harada:** Yes, it is. Particularly a supply of common growth diets causes an increase in fish faeces. Therefore, the use of "Saki-Hikari growth diet" will convince you of the effects of Hikari bacteria.

—It hear that to the idea of making healthy koi is basic to all the sorts of "Saki-Hikari." Can we consider that you've reached the goal by the selling of this time?

**Harada:** This is not a terminal station. (laughs) We always keep on developing new goods to be added to the list of a series of "Saki-Hikari." Apart from the concept that all the staff of our company ought to make healthy koi, we have another big slogan.

—Will you tell us about it?

**Harada:** Another slogan is "Production of evolved diets." We the staff of Yamazaki Research Institute always keep on repeating feeding experiments without sticking to the existing diets.

As far as diets are concerned, manufacturing processes, sorts, ingredients, and so on have still room for further improvement. If a new manufacturing technique is established, we are going to improve all the existing "Saki-Hikari" on and on. Therefore, our diets are less than perfect. A new "Saki-Hikari growth diet" has merely been added to the list of our goods.