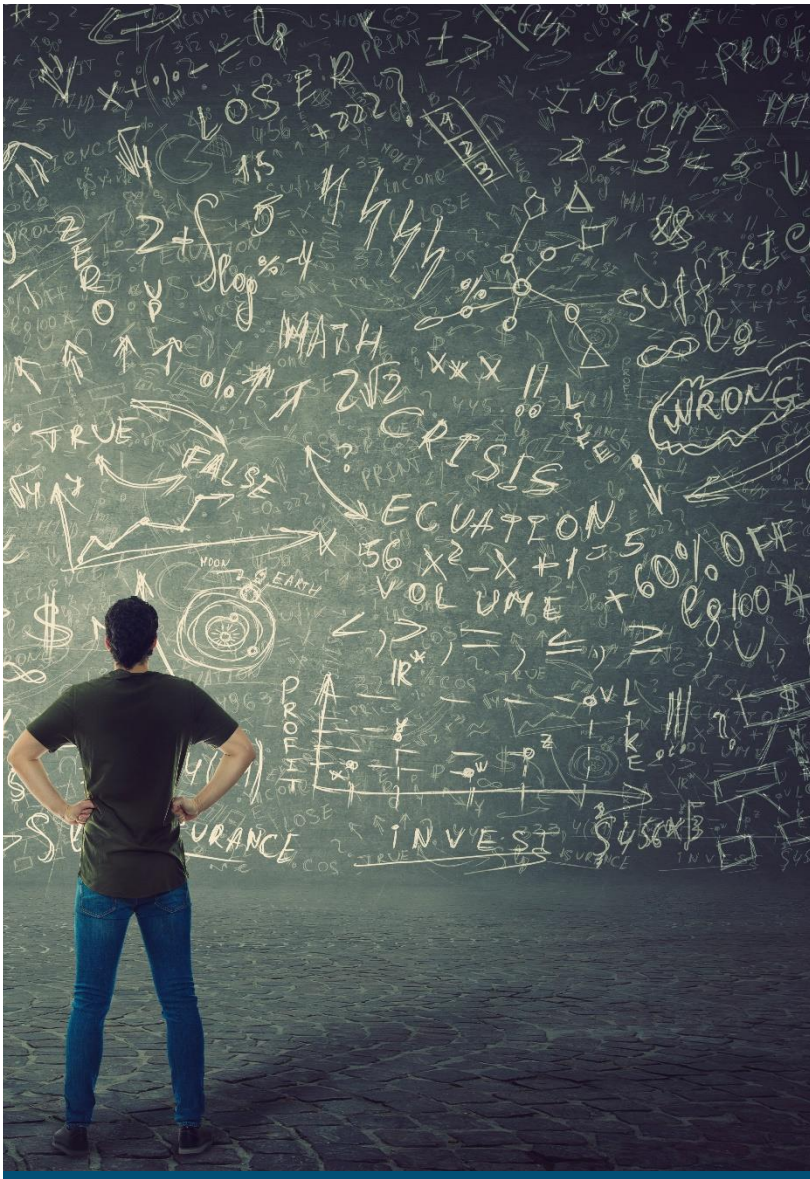
The Validity Of Grams Per Watt As An Effective Control Activity And Red Flag



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FEBRUARY 2022

Clarion Compliance
Authored by: Kirk Barry, CCCE

Effective Control Activities And Red Flags Regarding Production of Cannabis

A common enough expression in the marijuana industry is the term grams per watt (expressed as g/w). Some use g/w as information in marijuana facility monitoring and detecting illicit activity. Some entities search for published information from light manufacturers to use as independent information for any number of purposes. This author will examine the processes to determine g/w and comment on the reliability of g/w as an effective control activity in compliance oversight. Variations of g/w are in the marketplace, but the more common expression of g/w will be used in this paper.

This paper will examine the processes to determine grams per watt and comment on its reliability in compliance oversight

Grams Per Watt As A Mathematical Equation

Grams per watt is an expression used to state how much marijuana is harvested from a crop relative to the watts of electricity used to produce that crop. As a unit of measure, marijuana is harvested and weighed in pounds. You can convert pounds to grams by multiplying pounds by 453.59237. This is the "g" in g/w. In this instance, it is acceptable to truncate the multiplier so that one pound of cured marijuana is expressed as 453 grams of marijuana. Although marijuana may be weighed when it is first harvested (wet), it is essential to understand that yields are weighed and recorded when the product is dried and cured (dry weight). Cured marijuana is commonly referred to as flower or bud.

In electrical parlance, a watt is a unit of measure of energy use where one watt equals one joule per second. The watts of the lighting source are the variable "w" in g/w. There are many options regarding facility lighting products at this point. High-Pressure Sodium (HPS) is a ubiquitous bulb used in the indoor growing of marijuana. A more recent arrival is the light-emitting diode (LED). It does not matter what light or type of light is used in determining g/w. The type of light in relation to power consumption and its effects on the grow site is a function of the cost of goods produced and has no bearing on compliance assurance.

Although g/w may be considered a mathematical expression, it is not an equation. If one is to determine something, in this case, production, it is necessary to use an equation where one side

equals the other side. In its current form, g/w can be stated as "a variable divided by a variable." As expressed, there is nothing to solve.

G/W IS NOT AN EQUATION

The Process To Determine Grams Per Watt

The mathematical expression g/w is simplistic. The "g" represents what you are determining (what you want to know), and the "w" represents a variable you are using. There are two possible approaches here. The first is to find for grams by determining your clients' facility's total watts and further assuming there is a sufficient relationship to some published sales material from a light supplier regarding production capabilities. A second approach is a comparative approach. You determine the total watts of your clients' facility, ascertain the weight of the target harvest by querying your client, and then compare your results with the industry information you have selected.

The How-To

Once the flower is cured and ready for testing by a qualified lab, follow these four steps or its appropriate variant to determine g/w:

1. Determine your total pounds from a harvest
2. Express pounds in grams by dividing the number of pounds by 453
3. Add up all of the watts from your light sources
4. Divide the grams by the total wattage

Example Scenario

I had (literally mine) an operation that used HPS lighting at 1500 watts per bulb. We used nine bulbs for a total of 13,500 watts. Our production was 35 pounds per harvest. So we produced 15,855 grams using 13,500 watts. We can express that as 1.17 g/w (15,855/13,500).

Active Water Amounts In Cured Marijuana Flower

Flower is preferred to have a percentage of water content equal to about fifteen percent (generally speaking). Active water content is expressed as a/w. The flower's water content is vital in the analysis process because you ultimately assess production capabilities. I do not yet see a standard in the industry regarding a/w, and the curing process is left up to each business. Some field test units require a particular percentage of a/w to test for THC or CBD levels, such as the GemmaCert NIR Spectroscopy unit. For our purposes here, know that if you are going to confirm production weights, too dry or too wet will be problematic.

The Variables

Scientifically you must determine how many different variables go into the process of producing a crop. Here is a list of variables that will significantly affect yields and require examination and interpretation.

*Room temperature	*Nutrients used
*Root zone health	*Finishing supplements
*Strain grown	*Light type
*Light penetration below canopy	*Grow medium
*a/w at cure	*Pot type (root container)
*Grow style (sea of green, etc)	*Time of harvest in relation to gestation cycle
*Use of CO2	*Life cycle condition of the light bulb

Another significant variable in yield is the presence and ultimate eradication of pests, mold, or mildew. How will your results be reliable with nothing in place to account for these variables?

To Be Effective, All Variables Must Be Considered

Methodology #1 Comments

Using present-day yield results from a light manufacturer is particularly troubling. As in the GrowRay paper from our source materials, GrowRay went to great lengths to duplicate room conditions and processes for its stated head-to-head HPS to LED comparative study. I surmise GrowRay did that because they know that all factors make a difference, not just lights. Also troublesome is GrowRays' statement that they set out to prove their LED lights were superior. To GrowRays' credit, their yield was significantly better. For our purposes, starting a test from a conclusion lacks objectivity, and results should be suspect. In method #1, your problems are significant.

For your fact-gathering input material to be valid, your client's facility conditions must be substantially similar to the facility conditions from your source. Remember, at some point, you are comparing your material against your client's stated yields. Light type and total wattage are only two of the many vital processes that determine yield. Yields will fluctuate significantly depending upon an array of issues. It is safe to say that no two grow rooms are alike, and processes vary considerably from one facility to another. You have an additional problem here that is critical. If you use a paper like GrowRay's to assess your clients' facility, you are taking the published article out of context and using it as a pretext for your own purposes. The stated purpose of the GrowRay paper is far afield from your intended purpose. The exception here will be the unlikely event that

your client's facility is substantially similar to the test so that the comparison is reasonably valid. Be prepared to support your opinion that your clients' room is substantially similar for yield comparative purposes.

You Must Be Concerned About Your Work's Integrity

Methodology #2 Comments

Using this method, you find total wattage and then obtain harvest yields by inquiring of your client or by comparing information in any number of reports. This method is flawed as well. Personnel can remove an amount of flower from the batch information before they tell you how much they harvested. In the world of growing marijuana, results vary significantly. Some growers yield half a gram per watt and others 3 grams a watt or more. In the end, you have a stated amount of harvest and nothing to compare it to.

Integrity In Methodology

It is vitally important to maintain integrity and objectivity in choosing a methodology and its application. Information is essential when assessing or monitoring. But not just any information; accurate information. The reliability of your analysis will depend upon the reliability of your data inputs and variables. Desiring to be an expert in your field of work, you must be concerned about your work's integrity because your reputation builds and will follow you. In 1993, the supreme court rendered a landmark case entitled Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993). This case is referred to as the Daubert Standard. The Daubert Standard is used to assess whether an expert's opinions are based upon scientifically valid processes. If the reasoning or methodology employed is wrong, the opinions of the expert and conclusions from the data are not allowed. In present-day parlance, we refer to that as "junk science." If you use data that you know is flawed, you undercut your integrity and the integrity of your compliance structure. Your compromise will result in an internal system where the illicit actor can survive and potentially thrive.

Effective Control Activities

An effective control activity ensures necessary actions are taken to address risks to achieve the entity's objectives. If the entity's objective is solely to pass an audit, then with the auditors' consent, use g/w in method #1 or method #2 above. You will document your account and pass your audit. If your objective is to use an effective control activity for the purpose of assurance against the backdrop of reasonable diligence, you will not achieve your goal. Your actions are flawed, and your processes are insufficient. The illicit actor is always searching for vulnerabilities termed

"workarounds." Bad actors are drawn to ineffective control activities that require little effort to fool. When deploying g/w as a control activity, you create a false sense of effectiveness for your organizations' risk program and opportunity for the bad actor.

The Red Flag

A red flag is a tool used as a warning or a cause for concern that there is a problem or potential problem with a particular situation. It is not to be used as a false red flag. A false red flag is a disguise. It misdirects the viewer and leads them to a wrong conclusion(s). Carefully consider your control activities and ask yourself why they are in place. If the purpose is to uncover, do those activities uncover? Are they designed for that purpose? Were they created from an understanding of the inherent risk(s) of that business sector? Maintain the integrity of your risk management system by asking the hard questions.

Conclusions

Upon close examination, I find that g/w is not yet a reliable tool to be used as a control activity or red flag for most ancillary providers attempting to address risk genuinely. In the hands of a qualified operations expert, production yields and other tools are used to assure compliance as that expert can handle the diversity of variables that must be addressed.

As the marijuana industry comes of age, the regulatory sector and ancillary service providers are searching for effective processes to assure compliance and meet the mandates of their risk program. The pathways to experts and professionals who understand the cannabis sector are not as well defined as in other disciplines. Where to go and who to turn to is still challenging. Do not let that discourage you. Do not settle for the first thing you find or be enamored with a new thing you have not heard before. Refined methodologies exist, as do the experts who are disciplined in proper analysis and techniques. Ensuring your control activities alert you to address fundamental issues will only strengthen your compliance program and your effectiveness as a monitor. Resist mediocrity and the false red flag scenario. I have a saying, "The nothing that we are doing is the something that is required of us."